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JOURNEYS IN FRENCH INDO-CHINA (TONGKING, ANNAM, COCHIN CHINA, CAMBODIA*).

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The regions which are embraced by the general title of French Indo-China, and of the methods and incidents of travel in the different parts of which I propose to give some account, comprise the southern and eastern portions of the geographical area commonly described as the Indo-Chinese peninsula, and consisting of the territories situated between India and China, or in other words, between the basins inclusive of the Irawadi and the Red River. The geographical interest of this country consists in the immense rivers by which it is intersected, and to whose alluvial bounty it for the most part owes its origin, and to the mystery which still overhangs its interior recesses; there on the confines of China, Burma, Siam, and Annam, wild and little known tribes inhabit the pathless mountains, and unexplored rivers thunder down profound ravines. Its commercial interest lies in the competition which it has engendered between rival European nations for the easiest approaches to the remote but populous provinces of Western China, on whose borders it lies; and the immemorial but lengthy caravan routes conducting to which it is sought to supersede by the agency of steam locomotion by river or by land. Its political interest lies in the fact that within the last thirty years the ownership of this vast tract, obeying the universal law by which the hitherto hidden corners of the world are gradually yielding up their secrets to civilisation—has changed and is even now changing hands; the conquest of the French having placed them in possession of the

* The orthography throughout this paper has been made to correspond with the published Rules of the Society. The spelling Cambodia has been adopted on account of its common usage in this country, in preference to Kamboja or Cambogia. The author would prefer the last-named form, as being in stricter accordance both with general acceptance and with local pronunciation.

The map to accompany Mr. Curzon's Paper will be given with the second instalment in the September number.

whole of its eastern face from Cambodia to Tongking, and the acquisition of Upper Burma by the British having brought the latter into similar contact both with China herself and with the frontiers of the one surviving independent Asiatic kingdom, that now separates England from France in the Far East, viz., Siam. The French parts of Indo-China, with which alone I propose to deal in this paper, comprise four separate territories, in different stages of political absorption. These are, in order from north to south, Tongking, Annam, Cochin China and Cambodia. Their united populations amount to about 18,000,000; they extend along a coast-line 1700 miles in length, and they embrace an area $\frac{1}{6}$ times as large again as France. I will first deal with the main geographical characteristics presented by this dominion, the different sections of which possess a physical unity that facilitates the task of description.

I. General Geographical Characteristics.

In no part of the world has water exercised a more potent agency in determining the destinies or in providing the livelihood of man. The bulk of the French possessions owe their existence to the deposits of great rivers, the Red River (Song Koi), Black River (Song Bo or Da Jiang), and Clear River (Song Lo) in the north, and the magnificent volume of the Mekong in the south, and may be divided throughout into two areas —the mountains through which these rivers, rising in the plateaux of Central Asia and Tibet, force their way seawards, and the plains or deltas which they have themselves almost wholly created along the coast. The entire populated and wealthy part of Tongking consists of the delta of the Red River with its confluents, which is 80 miles broad at its base. The whole of Cochin China and much of Cambodia consists of the delta of the Mekong. The intervening territory of Annam, in so far as it consists of plain land lying between the mountains and the sea, is also the creation of smaller streams flowing down from the highlands of the interior.

In each of these regions, under conditions differing very slightly, the process of territorial formation, or encroachment upon the sea, can be watched in active development. On the maritime fringe the brick or gruel-coloured streams, surcharged with alluvium, leave their detritus, which the tide is not sufficiently powerful to remove, and which gradually solidifies, and gives birth to a rank vegetation of mangroves and other aquatic plants. Sometimes for a while these form floating islets, which eventually coalesce and find a common anchorage. Sometimes they are covered with saline swamps, in which case they are utilised by the natives as salt-pans. A little later, as the sea recedes, they can be drained and planted, and in a few years, what began as a muddy lagoon is transformed into a ricefield of cloth of gold. The process of

BAY OF ALONG.

formation is so rapid that Hanoi, the capital of Tongking, which is now 60 miles in a direct line from the sea, was upon it in the 7th century A.D., whilst in the 17th, the Dutch, who traded upon the Red River, had their maritime port at Hongyen, now 35 miles in the interior. I visited a place named Fat Diem, at the mouth of the Dai, on the southern confines of the delta, which has been entirely reclaimed from the sea within living memory, and is now occupied by smiling clusters of villages and rice-plots, irrigated by numerous canals. In Annam the growth of the land at the expense of the sea is accelerated by the action of the tides and winds, principally the north-east monsoon, which pile up long sand-dunes upon the coast, behind which the rivers, unable to pour their entire volume into the sea, spread themselves out in broad and sluggish lagoons, chafing idly to and fro, and daily diminishing in depth, till they too submit to the inevitable process and are choked. The same conditions are responsible for a phenomenon of constant occurrence on the Annamite coast facing eastwards, viz., the formation of sandbars off the mouth of almost every river without exception. These constitute during many months of the year an impracticable barrier to navigation, and compel vessels of any burden to lie out in an offing which rarely furnishes a secure anchorage. On the bars themselves the breakers form successive files of plunging foam, whose grey crests can be seen tossing skywards, and whose thunder can be heard for miles. At Hue, the capital of Annam, I could always hear the moaning of the bar at Thuanan, where is the river embouchure, over 6 miles distant as the crow flies, and at Vinh the roar was audible over an even greater distance. I crossed the bar of the Kua Hoi mouth of the Song Ka River near the latter place in a small native sampan, built mainly of bamboo, which charged the breakers full tilt, just after the crest had broken, and which, if it missed the right moment by a fraction of a second, was deluged from end to end. In Cochin China and Cambodia, a further phenomenon is encountered in the existence of immense tracts of country lying below the river-level, which in times of high water are converted into enormous swamps or lakes, whence only the upper branches of the trees emerge. The great lake of Talé Sap, *i.e.*, the Inland Sea, in Cambodia, which is a depression in the soil of this character, and is fed by the Mekong, experiences transformations so violent that in the rainy season its length increases from 70 to 120 miles, its area is tripled; and while in the low waters the fish, with which it abounds, can almost be ladled from its shallow trough, then from 2 to 4 feet deep, it is swollen by the floods between June and September to a depth of 30 to 50 feet. In Cambodia the abodes of man adapt themselves to these fluctuant conditions, for they consist of palm-leaf and bamboo huts, which, if belonging to a stationary village, are raised upon wooden piles from 5 to 15 feet in height above the ground, or are placed upon floating rafts moored by long poles to the bed of the stream,

and capable of being shifted from site to site according to the height of the waters.

One other phenomenon must be noticed that is common to these regions, and is replete with a geological as well as geographical interest. This is the existence of a peculiar rock formation, composed of a calcareous stone or marble, superimposed above the Devonian schists, and presenting the most picturesque and fantastic contours both in the sea, at no great distance from the mainland, and also at several points along the river valleys which have in earlier days been similarly situated. It consists of detached blocks or humps of rock, rising to a height of from 50 to 500 feet, with scarped sides and faces, but with summits and ledges covered with a superb and gracious vegetation. The action of the sea has carved the sides and hollowed the interior of these rocks into vast caverns and grottoes, and has fretted their outline into strange and abnormal shapes. The most remarkable instance of this phenomenon occurs in the Bay of Along, with its prolongation the Bay of Fai-tsi-long, an archipelago of thousands of islets so formed, which fringes the coast of Tongking for a distance of over 100 miles from the east border of the Red River delta almost to the Chinese frontier at Cape Pak-lung. One may spend days sailing in and out of the islets of this astonishing inland sea, which I do not hesitate to characterise as one of the wonders of the world, and which far excels the better known beauties of the Inland Sea of Japan. Low tunnelled passages, accessible only at low water, conduct to hidden basins or remote caverns in the heart of some of the rocks, and till recent times afforded an impenetrable retreat to the corsairs who devastated these waters. Near Turan, the maritime port of Hue, a cluster of similar rocks, called by the French the Marble Mountains, rises abruptly from the sand-dunes on the seashore, and is perforated with grottoes, which have been utilised by Buddhist monks for the establishment of one of those retreats wherein they appear uniformly able to combine aesthetic attractions with devotional needs. Their altars are enshrined in the bowels of the earth, and the ecstatic face of the gilded god shines faintly from the cavernous gloom. The other places in Tongking and Annam where I noted or was apprised of the same formation are (1) On a plain to the east of the Kua Kam, that embouchure of the Thai Binh, upon which lies the commercial port of Haifong; (2) between Kaobang and Langson on the east frontier;* (3) between Ninh Binh and the Catholic settlement of Kesho on the Dai, at a distance of over 30 miles from the sea; (4) at Dienho on the frontier between Tongking and Annam; (5) immediately south of Thanh-hoa, the capital of the province of that name. I have been informed that a precisely analogous formation is also visible at Lakhon on the middle waters of the Mekong.

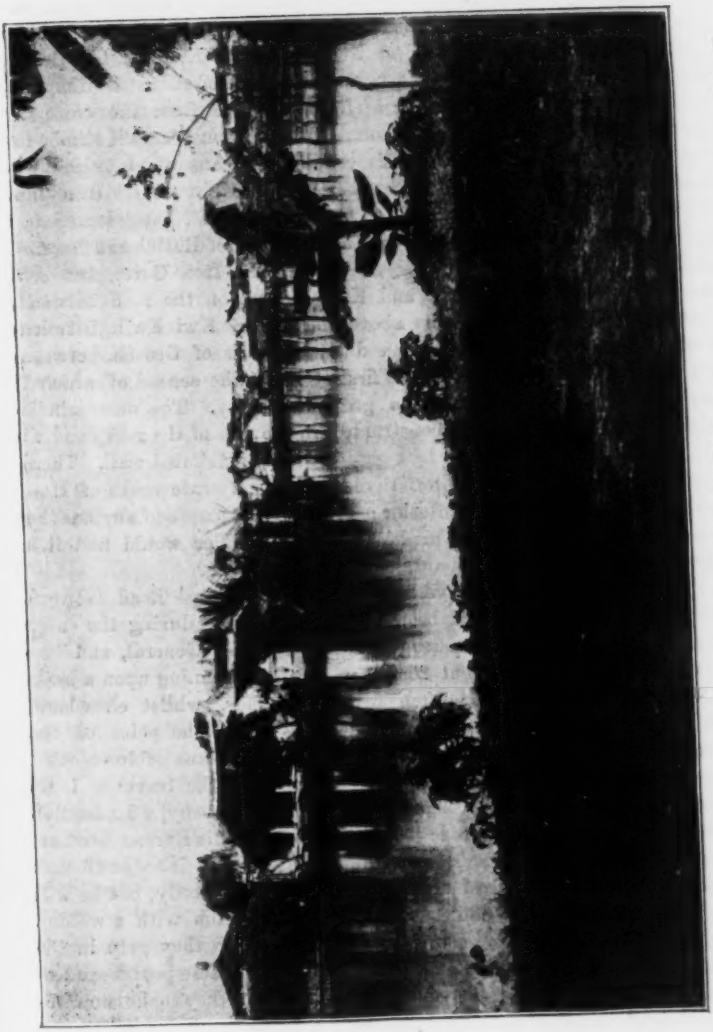
* For a description of these, *vide* a paper on the Hill Slopes of Tongking, by J. G. Scott, in *Proceedings* of the R.G.S. 1886 (new series), Vol. VIII., pp. 234–5, 240.

II.—Travel in Tongking.

From these general remarks I now turn to a more detailed description of travel in the various territories already named. I shall not occupy myself long with Tongking, inasmuch as travel in the delta of the Red River is performed almost entirely by river-boat, whether the steamers of the French Companies, or the Annamite sampan. The latter craft, though of modest dimensions, is well adapted for locomotion on the countless channels and canals with which, like a network, the country is intersected. In the centre an arched covering or hutch of palm-leaves or matting, shelters that portion of the boat in which the traveller takes his meals and sleeps, the only serious discomfort being the inability to adopt any but a sitting or recumbent position. In the fore and aft parts of the boat stand the rowers, propelling the craft with an oar, attached to a peg by a straw or rattan band, with a motion not unlike that of the Venetian gondolier. The mother of the family very often plies the bow oar, and children of five and six even lend a hand. When the central part of the boat is occupied by a passenger, the family, to whom the sampan is their sole home, either sleep, cook, and live in a similar partition adjoining the central hutch or in the open part of the boat forward. On the prow is painted, particularly in Annam and Cochin China, a black and white eye—one among many signs of Chinese influence. The landscape in the delta seldom varies, the rivers, streams, and canals flowing between banks which are fringed with areca palms, bananas, and bamboos, detached rectangular clumps of which, scattered over the surface of the country, invariably indicate the site of a village, whose palm-leaf huts are buried in the interior, and are accessible only by a labyrinth of narrow alleys cut in the thicket, easily defensible, and known to the villagers alone. Save for these interruptions of the general level, the country is entirely planted with rice, and the peasants working in the sodden patches look like black insects crawling upon a carpet of gold.

III.—Travel in Annam. (1) Hanoi to Hue.

I pass to Annam, a country possessing slightly different and even more interesting features, both political and geographical; political, because it is still administered by an Asiatic government, and contains at Hue, the capital, one of the few remaining courts where a purely Oriental and un-Europeanised ceremonial, modelled, like that of Korea, upon the China of the Ming dynasty, enshrouds the person of an Emperor whom his subjects regard as the Son of Heaven; geographical, because the diminution of water and the prevalence of mountains render the configuration of the country more diversified, and lend a greater romance to travel. Almost the sole channel of locomotion in Annam—



SMALL LAKE, HANOI.

until a railroad is made from Hanoi to Hue, of which the French talk much, but whose construction in the immediate future I greatly doubt—is a track known as the Mandarins' Road. This route, which has existed in some form or other from early times, was entirely reconstructed at the beginning of the present century from Saigon, the capital of Cochin-China, to Langson on the Chinese frontier, by the Emperor Gia Long, the founder of the reigning dynasty and of a reunited Annamite Empire. In Annam it usually runs at a slight distance from the coast or traverses the lower spurs of the mountains. In four places it climbs to some height from the sea, where it crosses by means of *cols* or saddles the transverse ridges which are pushed out at right angles from the main range. These passes are: (1) the Pass of Deo Ngang, sometimes called the Gates of Annam, between the provinces of Hatinh and Kwang Binh; (2) the Col des Nuages, also called the Iron Gates, between the provinces of Kwang Duk and Kwang Nam on the road between Turan and Hue; (3) the pass above the bay of Kwi Kwik, between Kwang Nam and Kwang Ngai: and (4) the Pass of Deo Sa, between Fu-yen and Khanh-hoa. The two first of these, the second of which I shall shortly describe, present a great similarity. The mountain is climbed by stairways cut or constructed in the face of the rock, and at the summit the pass is closed by a gateway in a crenellated wall. There appears to be a second and alternative route, at any rate south of Hue, amid the mountains in the interior; but I am not aware of any one by whom it has been mapped or explored, and a traveller would find it a difficult task without official aid.

In the parts where I travelled upon the Mandarins' Road between Ninh Binh and Hue, it had been in places repaired during the early part of the year for the passage of the Governor-General, and was commonly a flat track about 20 feet wide, either running upon a bank between the rice-plots or often over hot sands, whilst elsewhere, after rain, it was converted into a horrible bog. The poles of the French telegraph are planted along its side. The means of locomotion upon it are threefold, although it is seldom that the traveller is at liberty to make his choice. The first is the Annamite pony, a diminutive steed of great pluck and sureness of foot, not unlike his Korean brother, though rather a greater gentleman in appearance. He is so small that a European girth is almost always too large for his body, but he will carry a light English saddle. The natives ride him with a wooden saddle, and with a very narrow iron stirrup, which they grip in the cleft between the big toe and the remaining toes. These ponies are less quarrelsome than the Korean, and are so docile that they make no difficulty about crossing the numerous *bacs*, *i.e.* rivers, estuaries, or lagoons with which the road is intersected, and which can only be traversed in rude native boats, where a single movement of the horse would overturn the craft and its contents in mid-stream. I have sometimes had horrid

qualms while crossing a *bac* perhaps half a mile in width, with three or four ponies in the boat at the same time. In the country these ponies can be bought for £1 to £2; but in the cities, where they are ridden by French officers, and are driven both in pairs and four-in-hand, fine specimens will fetch from £10 to £20.

The second vehicle of locomotion is the hammock or palanquin, of which there are two varieties; the commoner consisting of a rude straw netting slung upon a pole, which is borne by two or more coolies; and the more elaborate official or Mandarins' palanquin, which is a net of crimson cords, has richly lacquered ends, a roof and screens, and which is carried by four or eight men. All Mandarins from the highest rank downwards travel in these palanquins, and most Europeans follow their example, especially in parts where ponies cannot march, or are not procurable. But for a tall man they are insupportable. Being fashioned to hold the diminutive Annamite, they cannot accommodate a 6-foot Englishman, and the most telescopic contraction of my lower limbs rendered it impossible for me to occupy one for longer than an hour. Seasoned travellers, however, sleep in them, while being carried along, with ease. The coolie-bearers march at a jog-trot, which enables them to cover the ground with great rapidity, and to accomplish at least 4 miles in the hour.

The third means of locomotion is the light chair, known in the East as the Hongkong chair, the back seat and foot-rest of which are attached together by cords, and which is carried by poles upon the shoulders of four or eight men. It is almost exclusively employed by Frenchmen travelling between Turan and Hue, but is not indigenous to the country, and will be found in none of the *trams*.

The mention of the latter name leads me next to describe that which is the most remarkable institution of travel in Annam. As long ago, it is said, as the eleventh century, during the dominion of the extinct empire of the Chams, there was founded a system of government postal stations called *trams* (the word is of course Annamite and has nothing to do with the English *tram*) along the main highways. These consist of posts at distances of from 8 to 15 miles apart, to each of which is attached a number of able-bodied men of the neighbourhood, who are held at the service of the state, being exempted in return from the *corvée* and from military service, and receiving a ration of rice. They are liable to be summoned at any hour of the day or night from their houses or from the fields by the *doi* or superintendent of the *tram*, who beats a drum, and, if they fail to comply at once with his orders, lays about him liberally with a stick. They are employed to carry the government post, are at the disposal of the Mandarins, and are hired by Europeans on the march. They go night and day, a messenger being sent on in advance to the next *tram* to advise the relay, and everywhere, *e.g.* at ferries, they have priority of passage. There being no beasts of

burden in the country, they are employed to convey all baggage as well as to carry the hammocks or chairs. The former are slung by cords upon bamboo poles, and are borne between two men. The caravan of quite a small party will thus frequently amount, all told, to from thirty to forty men.

The *tram* itself consists of an open house or shed, the side walls of which are made of mud wattling, and the thatch of the *attap* palm. On the floor are usually three low wooden or bamboo platforms raised about one foot above the ground, and spread with straw mats, whereon the traveller lays his couch. Sometimes there is a table in the centre and a small ancestral altar at the back. The front consists of shutters of palm-leaf or bamboo screens, which are held up by poles in the daytime but are let down at night. In villages where there is no *tram* the traveller is commonly offered the hospitality of the communal house—a somewhat similar structure on a rather more pretentious scale—which is part of the system of local autonomy that has reached so high a state of development in Annam. It is the property of the village, and the meeting-place of the council of notables; and its hospitality is dispensed by the village headman or mayor. Under his care, too, is the organisation of the village police and of the night guards. The night is divided into five watches of two hours each; and the vigilant taps of the watchman upon his *mo*, or drum, fashioned out of a hollow trunk, are an impediment to slumber.

Travelling, as I was doing, in semi-official fashion under the courteous patronage of the French, I was enabled to proceed with greater rapidity than the ordinary traveller, having covered as much as 40 miles in the day, whilst our party also met with a sort of reception at each village to which we came. A drum would be heard beating, and numbers of men would come out carrying banners of red, blue, and green flying from the top of bamboo poles. Escorted by these individuals, and by umbrella-bearers who ran behind and held over our heads the red or green painted official parasol of Annam, we entered the village, a coolie sweeping the road clear of dust in front of us. In this fashion we advanced to the communal house, before which a table would be placed in the open street, shaded by an official umbrella, and supporting a number of plates containing bananas, oranges, eggs, and other offerings; sometimes chickens or a kicking pig in a wicker hamper. Here the mayor would be standing, and, unless restrained, would kneel down and make his *lai*, or official obeisance, by three times touching his forehead upon the ground. Outside the larger towns we would be met by the local governor, or Mandarin. He would appear in his official hammock, attended by two or three umbrella-bearers according to his rank; by lictors carrying in a long case the recognised instruments of flagellation (administered in the same fashion as at an English public school, and considered no indignity even by persons of high position); by his pipe-

bearer; by a domestic carrying a wooden box in which were stored away his writing, smoking, and chewing materials; and by pikemen and banner-men. His own dress would, as a rule, consist of a tunic of dark figured silk or brocade worn over white cotton drawers and white stockings, and of a neatly folded dark blue, black, or green turban made of native *crêpon* or silk crape. In the lettered class it is fashionable to wear some of the nails long as an indication of superiority to manual labour; and I have seen a Mandarin the nail of whose left thumb described an aerial parabola not less than 3½ inches in length. I met many Annamite officials and Mandarins in the course of my travels, and was favourably impressed with their polish of manner, their correctness of deportment, and the quickness of their intelligence. They are divided into two categories, civil and military; and into two classes, with first and second degrees. The former are entirely recruited by examination, and their rank, precedence, and functions are defined by the rigour of an unbroken etiquette. No inferior Mandarin will take a seat while his superior is standing, or commence a conversation until the other has spoken. A small ivory plaque, hanging by a coloured cord upon the right bosom, indicates their rank; and those who are in the Government employ receive from the State a salary in money, rice, or silk. They seal their letters with a wooden die stamped with a character or symbol, which is smeared with a red paste obtained by scraping two potsherds together.

I will not describe the incidents of daily travel because they did not vary much from each other; nor are there many differentiating marks in the Annamite villages and towns. The traveller desirous of marching overland to Hue from Hanoi will probably abridge the earlier part of his journey in the delta by taking one of the river-boats to Ninh Binh on the Dai, from which place I append an itinerary of the stopping-places and distances as far as Hue, a total distance of about 360 miles. A stranger travelling with official assistance, his arrival being telegraphed in advance, and the *tram* service being set in operation so as to cause no loss of time in changing the relays, can cover this distance in about twelve days. Anyone not possessing these facilities would probably take much longer. I diverged myself from the Mandarins' Road to go by boat to Fat Diem, at the mouth of the Dai, where is a remarkable establishment maintained by an Annamite Mandarin known as Père VI., who is also a Roman Catholic priest, belonging to a family who have for long been Christians. He lives in great state in his patrimony, which he has himself, in the main, reclaimed from the sea, where he keeps a large guest-house for the accommodation of strangers, and where he has erected as many as four churches or chapels, one nearly as large as a minster, rather for the gratification of his own architectural tastes than for the service of his congregation, who are not more than sufficient to fill the smallest of the quartet. I rejoined the Mandarins' Road at

Thanh-hoa, the capital of the province of that name, which is situated near the Kua Chao, one of the numerous mouths of a fine river called the Song Ma. The provinces through which one passes subsequently are Ngean, of which the capital is Vinh, situated at a few miles distance from the Kua Hoi, one of the nine mouths of the Song Ka, another considerable river; Hatinh, with capital city of the same name; Kwang Binh, with capital Dong Hoi; Kwang Tri, with capital of the same name. At these places, which are under native rule as being part of the Empire of Annam, the French Protectorate is represented by French Residents, exercising general functions of supervision, but no direct administrative control; or by detachments of the native militia officered by French inspectors. The provinces themselves embrace the plains lying between the mountains and the sea—a strip which varies from 5 to 15 miles in width—and the more accessible mountain valleys. Annamite jurisdiction or French influence can hardly, except in a few places, be said to extend beyond the main crest of the range; the interior being inhabited by tribes either independent or dependent upon the Siamese, who are strongly planted upon the Mekong, and who claim to exert a sovereignty over the entire watershed draining into that river. This claim is disputed by the French, who, on their side, are continually despatching exploring parties into the hills with the view of drawing the tribes within the radius of French influence. The only points along this line of coast where it is possible for a steamer to anchor during the winter months are Vinh, Ron, and Dong Hoi.

MANDARINS' ROAD—HANOI TO HUE.

	Kilometres.
Hanoi *viâ* Hongyen, Fuli, and Kesho to Ninh Binh.	
Ninh Binh to Choganh	8
Binson	12
Dolen or Daulin	10
Trinson	13
Thanh-hoa	9
(Alternative route. Fat Diem to Dienho, 8 kilometres; Hatrung, 16; Thanh-hoa, 42.)	
Futinh Gia	30
Thoson	10
Hoa Mai	25
Fu Dien	28
Pagode des Paons	11
Vinh	24
Hatinh	48
Kyanh	50
Sudong	35
Gates of Annam	13
Ron	12
Botrach	32
Dong Hoi	23
Mi Daiet	28
Carried Forward	421

MANDARINS' ROAD—HANOI TO HUE—*continued.*

	Kilometres.
Brought Forward	421
Mitho	20
Cho Huyen	35
Kwang Tri	31
Fuok	40
Hue	30
Total	577

577 kilometres = 360 miles.

The towns encountered along this route differ only from the villages in consisting, as a rule, of a cluster of the latter massed together, sometimes behind the shelter of a wall, and protected by an immense fortified enclosure, called the Citadel. The villages are composed of houses roofed with a thick thatch of palm leaves, and walled with the same material or with a watling of bamboos and mud. The interior of the poorer cottages comprises solely a number of low platforms, for purposes of work by day and sleep by night, and the cooking arrangements at the back. In the richer dwellings the centre is occupied by a reception-room, corresponding in arrangement with the communal hall, which I have already described, and containing a central table and arm-chairs, an altar behind, and sleeping stands on either side. In a Mandarin's house the altar will be adorned with handsome censers and with a shrine containing the ancestral tablets; while long boards, inlaid with Chinese characters in mother-of-pearl or brightly coloured embroidered hangings, will hang against the pillars. Life among the poorer classes is mean and squalid, but not dirty; and the streets, even of the humblest hamlet, have an orderly and picturesque appearance, very different from the filth of China and Korea. Yellow fox-like dogs prowl about; pigs with piebald skins and pendent bellies run in and out of the houses; and naked, shaven-pated children abound. In the next superior grade of architecture tiles take the place of thatch, and wood and bricks of the mud walls. Finally, the citadel of the capital towns, laid out on the Vauban plan by French engineers at the end of the last and beginning of the present century, in the Gallophil days of Gia Long, or built in imitation of their designs, is a vast quadrilateral space, frequently some miles in circumference, surrounded by a red brick wall, rising from a moat, with projecting bastions and lofty gate-towers. In the interior is usually an official residence containing a large reception-hall, erected for the Emperor or his official representative, and several big granaries for the storage of rice. These great indefensible fortresses seem to have been designed to contain the entire population in times of peril, and before the widespread use of scientific implements of warfare. From any other point of view their vast extent is a danger, and they are now useless.

One of the exasperating features of travel in Annam is the confused and confusing nomenclature of places. I have said that the towns are

frequently composed of several villages, and similarly the villages also consist of several hamlets. One arrives therefore at a place to find that it has four names; (1) the name of the particular hamlet or cluster of houses; (2) the name of the larger unit or village to which it belongs, and which may contain two to three, or even seventeen to eighteen different hamlets, each with a name of its own; (3) the name of the market, which is sometimes outside the village, and usually has a title of its own; and (4) the name of the *tram* which also has a separate designation (recognisable in the province of Hue by the prefix Thua). It may easily be imagined under these conditions how difficult it is to construct a map in the first place, and into what a quandary one is often plunged by such maps as already exist. Even the French Government map, with which I travelled, but of which I was not able to procure a copy, is frequently incorrect, and offers but an uncertain guide.

The markets to which I have alluded are among the most picturesque and characteristic of Annamite spectacles. They are held on stated days in the week either in an open place in the middle of the village, frequently tiled over or thatched as a protection against the sun—the site being the property of the commune and being let out in plots or stalls—or sometimes in the open country at a central spot between several hamlets. Marketing is entirely conducted by the female sex, who may be seen for miles walking in single file along the narrow dykes that separate the soaking rice-plots, and carrying their produce in baskets at the end of a bamboo pole. Others will approach in sampans along the waterways and canals. When business opens there is just such a jabbering as in the monkey-house at the Zoo. The women squat down by the side of their wares, and intersperse a ceaseless chatter with chewing of the betel leaf, and ejection of long splashes of scarlet saliva from their discoloured mouths. You will see exposed for sale pigs, chickens, and ducks in hampers, fish, fresh, slimy, shell, and sundried, big prawns and tiny land-crabs, cabbages, radishes, the areca nut, vermicelli, cakes, sweetmeats, and eggs. Elsewhere will be cheap articles of furniture or raiment, tin lamps for petroleum, pottery, brassware, opium pipes, bracelets, necklets, amber buttons, palm-leaf hats, turbans, Bombay cottons and scarves.

From the number of temples, or pagodas as they are called, which are scattered throughout the country, in every picturesque or graceful spot, on wooded knolls, at the top of mountain passes, on the banks of rivers, or amid clumps of trees, one might infer that the Annamites were a people much addicted to religion. Such is not the case. Their faith is a strange and incongruous amalgam of various superstitious cults and creeds. Buddhism is more or less widely diffused, but in a very attenuated form, barnacled with all manner of corruptions. Chinese ascendency has brought with it the ethics of Confucius, and the worship of a host of demi-gods or glorified heroes. But for the most part spirit-

worship, or a crude demonology, may be denominated the popular creed, the majority of the pagodas containing little beyond altars on which a censer smoulders to the *genius loci*, to the good spirit or the evil spirit of the site, to the dreaded tiger, or to the *manes* of some celebrity of the past. The larger pagodas consist of two or three courts, in the hindermost of which stands the temple beneath a tiled roof, closed round with wooden doors. Fantastic animals, elephants with howdahs, kings and warriors on horseback, or tigers, are painted in fresco or sometimes fashioned in high relief on the entrance gateway and around the courts; and a bizarre but brilliant effect is produced by fragments of broken pottery stuck in plaster, and forming patterns of dragons or fabulous monsters on the walls and roofs. Far away superior however to any other religious sentiment or influence is the worship of ancestors, which is predominant in the organisation alike of the State, the Court, the commune and the family. At the great annual festival of the *Tet* or New Year, the outpourings of hilarity are mingled with an elaborate ritual in honour of the dead; and the humblest house contains an altar neatly installed, and often sumptuously arrayed, whereupon tablets are erected to the memory of the departed.

Burial is the ordinary method of disposing of the dead, and large cemeteries are sometimes encountered; although a more haphazard system of interment appears to be general. The site of the grave is usually determined by augury, and may be anywhere, for instance in the middle of a ricefield. The plot is bought and paid for, and is never afterwards sold. Once a year it is visited by the relatives or descendants, cleaned and decorated. Of the tombs four varieties may be distinguished: (1) the Royal sepulchres of the reigning dynasty near Hue, which are among the finest and most beautiful in the world, consisting of hundreds of acres of wooded hill and valley laid out in terraces and lakes, and adorned with obelisks and sanctuaries; the scheme being borrowed from the mausolea of the Chinese Emperors, but the style being either original, or perhaps imitated from France; (2) the graves of the Mandarins and upper classes, which consist, like those in China, of a horse-shoe or arm-chair enclosure, faced with stone, and containing sculptured *stelæ* and altars; (3) the graves of the middle-classes, which are sometimes covered with a rectangular stone case not unlike those common in England in the last century; and (4) the graves of the poor, which are either small mounds plastered over, or circular grassy heaps. Unlike Korea, where pines are invariably disposed around or near the graves, no timber is planted about them. There is a very extensive cemetery where everyone of the above-mentioned styles may be observed outside Hue near the Altar of Heaven, which the French call the Esplanade des Sacrifices. There is also an old and crowded necropolis between Saigon and Cholen in Cochin China.

(*To be continued.*)

WITH THE RAILWAY SURVEY TO VICTORIA NYANZA.*

By Captain J. W. PRINGLE, R.E.

So many distinguished travellers have now journeyed from the East Coast of Africa to the great lake, that the countries I propose describing can in no way be termed new or unexplored. But perhaps no former travellers have devoted so much of their time to actual survey work as the officers who have been working with Captain Macdonald during last year (1892) between Mombasa and Uganda. An account of how this survey work was conducted, and what methods were used, may be of some interest. The Survey parties left Mombasa, on Dec. 20th, 1891, reached Machako's, Feb. 20th, 1892; Kavirondo, May 18th; Uganda, June 11th; Kikuyu, August 8th; arrived at Mombasa, September 23rd.

We commenced by attempting to obtain a skeleton outline of points fixed by triangulation, upon which to build our detail sketches. At the very outset this was found impossible without spending more time than we could well spare in clearing and cutting away the thick thorn-bush and raising well-defined triangulation points. One such point, built of dry stones by an advance party of Swahili porters, was some 6 feet high, in a small clearing surrounded by high thorn trees. On seeing its position and surroundings, we no longer wondered that we had been unable to see it. We had therefore to give up the idea of triangulation, and be content with a less ambitious survey. Accordingly every day's march was traversed and sketched with compass, watch, clinometer, aneroid barometer, and pedometer. On arrival in camp a plane-table was used from some adjacent high ground to further sketch in the country. These preliminary sketches were made on a scale of 1 geographical mile to an inch, and subsequently reduced to half that scale. A section of the route traversed was made on a horizontal scale of 1 statute mile to the inch, and vertical 100 feet to the inch.

The positions of our camps were checked daily by latitude and longitude observations of the sun and stars. For this purpose watch chronometers were used. To check the rating of these watches, we had occasional observations for absolute longitude with a telescope: such as the occultation of a star by the moon, or of one of Jupiter's satellites. Comparative checks for longitude were obtained by azimuth observations to some well-defined point we had fixed behind us, which, the latitude being known, gave us the "departure." Latitudes were fixed by altitude observations to north and south stars on the meridian. Further observations were taken frequently for the variation of the compass.

As regards altitudes obtained by the survey parties, we can in no case claim to establish absolute heights. The only instruments we used

* Map, p. 192. This paper was written in January, 1893.

for altitude observations were surveying aneroid barometers. These, in so far as they gave us relatively correct heights, were sufficient for our purpose. As frequently as halts permitted the diurnal wave corrections of these barometers were checked. We noticed that this diurnal wave correction was fairly constant in low altitudes, but in elevations over 5000 feet, or wherever there was much dampness in the air, there was considerable fluctuation before 9 A.M., at which time the diurnal correction again became regular. The heights of camps, to allow for this irregularity, were always fixed by afternoon observations. Any difference shown by an early morning reading was adjusted to the former afternoon reading; the diurnal correction again becoming normal after 9 A.M. These aneroid barometers, by means of a vernier, enabled us to read a difference of level of 5 feet. Heights of hills we did not actually ascend were obtained by theodolite angles.

I have mentioned that we used pedometers. These, it is generally stated, are unreliable; but our experience was otherwise. We generally had three pedometers working with each survey party, and frequently checked these over measured distances. The result in one instance was that when two of our parties met in Kavirondo, after each had marched some 250 miles by different routes, we found a difference in dead reckoning position of only 2 miles. In fact, we have been able to discover sudden variations in the rating of our watches by the accuracy of these traverse sketches.

The following were the principal routes traversed by the Railway Survey parties:—

1. Between Mombasa and Tsavo. Two routes—the usual caravan route, by the so-called Taru Desert, and the Sabaki Valley route.

2. From Tsavo to Nzoi. The caravan route through Kibwezi, and the Athi River route. The "Sabaki" River, above its junction with the Tsavo River, is known as the "Athi."

3. From Nzoi to Machako's three routes were traversed. The caravan road through the Ulu Hills, another to the east, following the Machako's River, and the third to the west, and outside the Ulu Hills, on the edge of the great Kapite Plain.

4. From Machako's to Naivasha. Three routes were surveyed over the Athi Plains into Kikuyu, thence two down the Kikuyu escarpment, into the lakeland of the great meridional rift.

5. From Lake Naivasha three main routes were examined to the Victoria Nyanza. One to the south, from Lake Naivasha, through Sotik and Lumbwa, to Ugowe Bay; another to the north, by Lake Baringo, crossing the Elgeyo and Kamasia escarpments; and the third lying between these northern and southern routes. This is generally known as the Guaso Ngishu route, which ascends the Mau escarpment from Lake Nakuro, and thence follows the Guaso Masa and Nzoia Rivers.

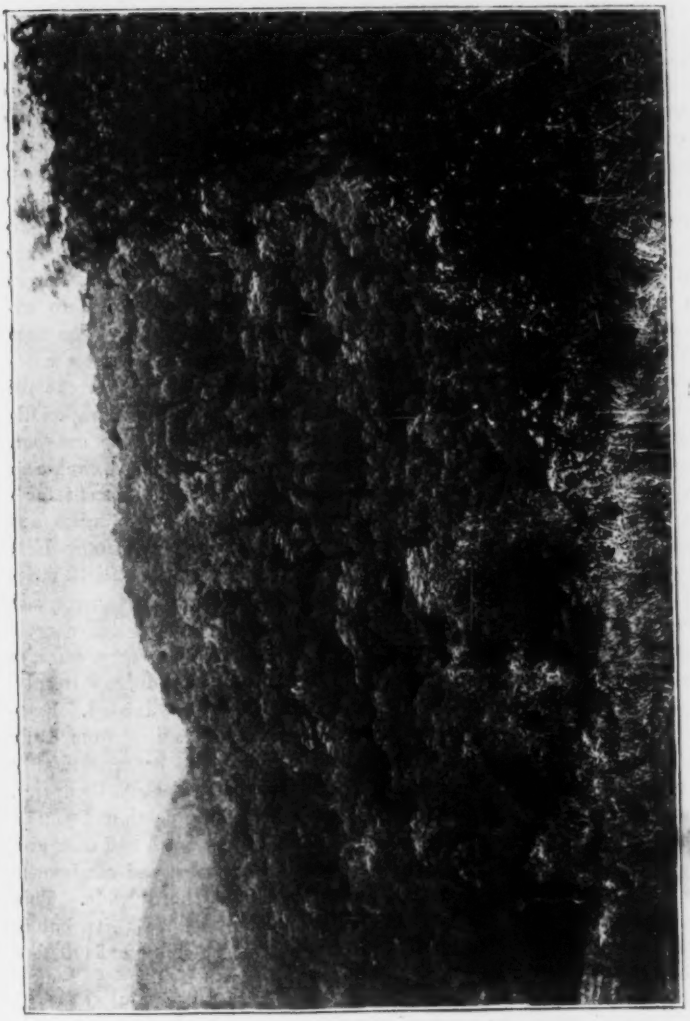
On the shores of the Victoria Nyanza our survey for the railroad was completed; but two of us travelled thence along the northern shores of the Lake into Uganda, doing as much survey work as the limited time at our disposal allowed.

Further minor routes were surveyed, one towards Mount Elgon from Kavirondo, another through the Samia Hills, and round the north-east corner of the Victoria, a third through Kabras, and others round Machako's and the Ndara Hills. The limits of the survey are, roughly, between the parallels of latitude 1° N. and 4° S., and longitudes 32° and 40° E.

Let me now try and describe the general characteristics of the country and people you would see travelling along some of these routes. The island and town of Mombasa you have heard of frequently, so it need not now detain us. One noteworthy point is the fine and well-protected harbour on the south and west of the islands known as Port Reitz and Port Kilindini. We will cross to the mainland, and there we will see a green fertile belt of country, 10 to 15 miles wide, which stretches upward to a line of low coast hills. As you climb these heights you will pass through plantations of graceful cocoanut palms, fields of Indian corn and simsim, patches of sweet potatoes and millet, groves of bananas and magnificent mango trees. Streams course the hill-sides; and everywhere are signs of a bountiful nature. It is warm—unpleasantly so—in the sun; but in the shade, even out of doors, and at night, it is cool and pleasant.

From the summit of this fringe of hills, some 600 to 900 feet above the sea, as you gaze inland, you will see nothing but what looks like a great grey sea, rolling away from below you to the dim horizon. You are disappointed. There is nothing tangible, no bright colouring or bold outlines. Nothing but an indistinct flat wash of neutral tints, with here and there a silver streak, and in the far distance low grey hills. But once descend into the valley lying at your feet, and it is no desert we enter. Gently undulating country, rising always but imperceptibly. Indeed, for the next 30 miles the general upward gradient is scarcely more than 1 in 200. All around you will see low flat-topped thorn trees, blossoming white and red, long waving grass, dense clumps of aloe and euphorbia, long-armed creepers of the convolvulus tribe, huge bulbous roots that look like masses of rock, and if it be the morning, all is sparkling with the diamond dust of dew.

A red ribbon-like path leads you on, here winding round a fallen tree, there gradually forced to turn aside for an ever-growing thorn. The country is sparsely populated by the Wa-Druma who are but poor cultivators. And so on, till the twin hills of Taru are reached some 45 miles from the coast. These hills are densely clothed with unapproachable thorn and euphorbia, and only rise some 300 feet above the surrounding



MAU FOREST.

plain. Here are to be found in the sandstone rock the far-famed water-holes, which during the dry season are the only sources of water supply in the Duruma country. Some say these are artificial, but surely they are too deep and too regular in shape to be the work of the present type of East African savage. It is more probable they are the result of disintegration set up by decaying vegetation in natural hollows in the rock. Another theory is that they are natural air holes in the rock strata; this is supported by the fact that walking over these rock formations an occasional footstep makes a hollow resounding noise denoting the presence of still covered holes. These waterholes are met with in many other places on the caravan route, but none are so remarkable in extent and regularity of formation as are these at Taru. We have reached a height of 1300 feet at Taru camp, and before us stretches the so-called Taru desert. A change is noticeable in the surface features of the country. No more undulations of ridge and valley but an almost level plain. The next 30 miles showed a general gradient of only 1 in 400. It is not a sandy desert as we understand the word. The soil is less fertile, bright red in colour showing a large amount of mineral composition, especially iron, and is exceedingly porous. The same dwarf thorn trees are seen, though growing more sparsely, the grass is more patchy and the euphorbia and aloe are rare, but the wild fig-tree seems to flourish. Except for a day or two after rain has fallen, no water is met with for 33 miles, and then after climbing 1000 feet from the camp to the top of Maungu Hill, the rock-bound pool is sometimes found dry and water is still 12 miles off. Water tins are generally carried between Taru and Maungu, and the marching done by night, but even so the porters often suffer great privation. I have known men barter half a month's pay for a drink of water from a more fortunate or more provident companion's supply. But the distance is much less than has been hitherto estimated. Even by the winding caravan path it is only some 34 miles from Taru to Maungu camp, and this distance will no doubt be considerably shortened by the road now in execution by the I. B. E. A. Company. Maungu is one of a series of isolated ranges running north and south; other ranges are Kisigao, Kilibasi, Pikapika to the south and east, and the Ndara and Ndi hills to the west. Instead of shales and sandstones we have metamorphic formation, gneiss, schist and hornblende. This Maungu range was formerly inhabited by a colony of Wa-Teita, but is now uninhabited. The highest point on Maungu is some 3400 feet above the sea.

West of Maungu the same level thorn bush country extends to the Ndara Hills. You will see, however, for the first time what have been so aptly termed "earth-boils." These are sometimes small conical shale or clay hills, sometimes long strata of granite or igneous rock which rise above the bush like huge hog backs. Among the Ndara Hills live the

Wa-Teita, their villages composed of round thatched huts on the hill-tops, and cultivation in every nook and cranny that holds the fertile soil. Sugar-cane is much grown, also Indian corn, bananas, tobacco and sweet potatoes. These same Wa-Teita are beginning to appreciate the advantages of trade and civilisation. They farm ostriches, and carry on a large trade with the coast in goats. They have large plantations of maize and millet in the plain round the foot of the hills, and were it not that they are generally at war with their neighbours, the Masai and Wakamba would doubtless extend their holdings further into the plain, and along the banks of the Voi River. This stream, the first of any size that is met with, rises in the Bura Hills to the westward, and intersects the Ndara Hills. Emerging from these on to the plain, its waters are soon absorbed by the thirsty soil, and except after rain none ever reaches the sea. Water, however, may generally be obtained by digging in the sandy bed. Its banks are clothed with dense jungle and aloe, the home of innumerable guinea fowl.

Crossing this river you will traverse another plain, park-like in its appearance, and bounded on the west by another range of hills known as Ndi Hills, also inhabited by Wa-Teita. This plain is studded with these curious earth-boils and rock outcrops I have mentioned, and to the east stretches away to the Sabaki River. On this plain and also between Maungu and Ndara, the palah antelope, zebra, lesser koodoo, and in the rains giraffe may be met with. The highest point crossed is some 2100 feet, and an easy descent takes you down into the valley of the Tsavo River. The surface soil for the first time becomes stony, and outcrops of rock numerous. This Tsavo River is some 145 miles from the coast by caravan road, but only 125 by railway. It is fed by the snows of Kilimanjaro, and the stream of water is very considerable. You will find we are still only 1450 feet above the sea, having ascended on an average 10 feet a mile. The banks of the river are studded with a fibrous palm, and the rocky bed is the home of at least three kinds of excellent fish. The caravan road crosses the Tsavo at a point only some 5 miles above its junction with the Sabaki River, and not 15 miles to the westward of this junction, as has been estimated. So far as we have come, the gradients are easy except in the ascent to the low coast hills, and beyond the Voi and Tsavo Rivers nothing of any size has to be bridged.

You will enter the confines of another country on the left bank of the Tsavo River, known as Ukambani. This is bounded on the north and east by the Athi River, and the edge of the great Kapite Plain on the west. The country is divided into two well-known districts, that of Kikumbuliyu to the south, of which Kibwezi, the home of the Scottish East African Mission, may be termed the centre, and that of Ulu to the north, a central feature of which is the far-seen Nzoi Peak. At first no change is noticeable in the general features of the country. The same

thorn bush and grass country prevails, but the rise is much more perceptible. At Kibwezi, some 60 miles from the Tsavo, we have risen 1600 feet, and are 3100 feet above sea-level. Here, amidst forest and wood, grassy glades and the most delightful pure water flowing over lava boulders make the country attractive to the eye. Fine straight timber for building purposes is easily obtainable, and the soil is what is known as "black cotton," or a fine volcanic loam. A curious feature is a strip of a mile or more in extent of loose lava rock on either side of the Kibwezi mission. This is bad to travel over, but has been quite avoided to the south by a new road lately made by Mr. Wilson. I have noticed also that wherever this black cotton soil is found in conjunction with forest growth, butterflies with the most gorgeous colouring seem to thrive, and this is especially the case at Kibwezi, Ngongo Bagas, and Uganda.

Beyond Kibwezi another isolated range of hills known as Mbinzau is crossed, and the country becomes much more open. Before Nzoi is reached, three streams have to be crossed. The first, known as the Kiboko River, with beautiful clear water, rises in the Ongolea Hills. Only 2 miles further on is a brackish stream called the Salt River. This winds its way from a salt swamp surrounded by low bare hills on the edge of the Kapiti Plain into the Athi River. During the rains, owing to the volume of fresh water brought in by its tributaries, the saltness of the water is not noticeable, but in dry weather nothing but a series of pools is to be found of decidedly brackish taste. Herds of wildebeest, zebra, several kinds of antelope, and the ungainly rhinoceros swarm on the banks of these rivers, attracted by the rich grass and brackish water. All the streams met with in Kikumbuliyu flow from west to east direct to the Athi River.

A long waterless march over rough uneven country, much intersected by dry watercourses, brings us to the Ndange or Wakafukoa River. Another march and we are camped in the fertile and populous district of Nzoi. The Nzoi peak is a landmark for many miles. It has an elevation of 2400 feet above the surrounding country, and a total altitude of 6100 feet. To the south it ends abruptly in a precipice some 1000 feet high, and is 7 or 8 miles in length. Easy of ascent from the east, on the west it is crowned by precipices which are generally unassailable. The hill-top is only some few yards wide, and is covered with bracken fern 4 feet high. Maidenhair and other ferns grow luxuriantly in the rock crevices at an elevation of 5000 feet. An incident in our climb up this hill will show how one's best endeavours are sometimes thwarted. We had meant to take a round of azimuth observations from the top of the hill, and some men were carrying a theodolite and other instruments behind us. We came to a rather awkward rift in the hill-side, and proceeded with perhaps more noise than necessary to take off our boots, the better to climb it. Suddenly down from a hole in the cliffs above

us came a swarm of angry bees, and though we managed to get past with but few stings, our men with the instruments had to beat an ignominious and hasty retreat down the hill, and so we got no observations. Moreover we had to wait till dark when the bees were asleep before we could venture down again. The climate here is temperate and cool; the maximum variation of temperature noticed by us was between 58° and 82° Fahr., and this even though at an altitude of only 3600 feet.

Northward of Nzoi to Machako's, 310 miles from the coast, the country is mountainous, innumerable streams are met with, and the watersheds are curious and complicated. The caravan road winds up a torrent bed in loose shingle and sand, and the ascent would be difficult and tortuous for anything but a bridle path. The hills are populous and much cultivated. The elevation of the Company's Post at Machako's is 5400 feet, showing a general ascent of 1700 feet in 45 miles from Nzoi. Here at Machako's it is so cold and chilly in the evenings and at night, that we found living in tents decidedly bracing. In these hills all sorts of English vegetables have been grown and done well. Sugar-cane flourishes, quantities of Indian corn, millet whimbi (*Elusine coracana*) and other cereals are grown, bananas and tobacco are met with in abundance, and many kinds of bean and pea. Cattle, sheep and goats are met with in large numbers, especially down Machako's River and to the east of Machako's Hills.

Perhaps an account of the appearance, manners and customs of the Wa-Kamba or people of this country of Ukambani may be of interest. The men are well built, but rather slight and not tall. They wear little or nothing but ornaments, sometimes a goatskin is thrown over their shoulders, or a piece of cloth dyed a reddish brown with a mixture of clay and grease. They smear their bodies from head to foot with the same lubricant, and file their front teeth into points. In this habit they are recognisable from the Wa-Teita. They are fond of hanging small brightly-burnished copper coins in rows across their faces, or of wearing a small gimcrack mirror suspended upon their foreheads. They have curious decorations for their feet, which resemble nothing so much as spats made of strings of white or pink beads. They may still further beautify their persons by a dab or two of yellow or blue colour round the eyes. They are armed with a bow and quiver of arrows, knobkerry and spatulate-shaped sword. The arrows are either for show or for war —in the latter case they are larger and poisoned.

The women have the same liking for bead and brass wire ornaments, and nearly the same disregard for clothes. Whilst unmarried they shave their heads, but after marriage they grow a top-knot of hair resembling nothing so much as a rough mophead.

Their villages consist of clumps of from five to fifteen huts, low and grass-thatched, the sides often of timber or wattle and daub. Each small village has its own headman who acknowledges the supremacy of

no other chieftain, so that unity of action is considerably discounted. This chieftainship is not necessarily hereditary, but is generally claimed by the most wealthy man. There is, however, in each district a council of Wa-ze or old men, who advise and consult on questions of national import. The ceremony of marriage is very similar to that described by Mr. Thomson among the Wa-Teita. After consulting the maiden and her parents, and agreeing upon the number of cows or goats he must pay, the would-be bridegroom has to carry the lady off despite her pretended struggles and the feigned hostility of her family. The christening ceremony consists in smearing the face of the child with the blood of a freshly killed fowl. When a man or a woman dies, the body is not buried, but as in the Masai country, is carried away and left in the bush. A chief is sometimes buried as the only exception to this rule. The villages are not permanent and are only occupied for a few years at most. A few deaths or an outbreak of sickness causes the abandonment of the old village in favour of a new site, and the unsanitary surroundings of a village do not render a change of site surprising. They are not great warriors, they elect no general, and each man fights as he thinks fit. The fight generally resolves itself into a few flights of arrows from some secure hiding, and then a general retreat.

The Wa-Kamba are hard-working and industrious, and have already shown aptitude for European methods and ideas of work in the construction of a road under the supervision of Mr. Wilson of the S. E. A. Mission. They are great agriculturists, and never lose an opportunity of extending their fields and cultivation when they think themselves secure from their enemies. They have been unfortunate of late, and have had to beat a retreat from several fertile spots, owing no doubt to the straits the Masai have been put to, to gain a livelihood, which have emboldened their raiding propensities. They are great traders, and continually travelling to the coast with goats and cattle for sale.

Their religious ideas are vague. They have a belief in a supernatural power or powers, and certain large trees and notable rocks scattered over the country are identified with the power. The connection arises in this way. When rain fails some prominent tree or rock is selected as a place of sacrifice. If rain falls it is evident that that particular tree or rock is pleasing to the divine power, as similar offerings at other places have failed to obtain the desired effect. So the spot is endowed with a certain divine grace, and here the sick go to sacrifice for their recovery. One of our camps was inadvertently pitched on one such sacred spot, and the villagers would have nothing to do with us, expecting to find us all dead men next morning. However, as their anticipations were not realised, they followed the caravan on the march the next day to make up for lost time in the way of barter. We had some difficulty in persuading the Wa-Kamba at Nzoi to give us guides to the

NGARI DAVASH, MAU FOREST.

top of the hill, as they said their god lived there, and that often they had been driven back in terror by hearing supernatural and terrifying sounds. Said they at last, "We all know you are God's sons, and therefore He will not hurt you, so we will go." They believe in the efficacy of charms, and will erect an arch of bent sticks over a main pathway, from which will hang charms, generally one or two dead chickens to keep off the Masai.

The Wa-Kamba are advanced materialists, believing that as a tree grows up, flourishes and dies, so is the life of a man. They are not quite certain what to make of Europeans. Some say we are a cannibal race from the sea, others emanations of the divine power. In many villages they would not believe that we slept in our tents, but that we used these simply to prevent the common herd from seeing how we transported ourselves to the heavens, where they were convinced we slept among the stars. They explained our climbing hills and gazing at the sky through instruments, by the theory that we were searching for another road to the heavens. The sun, they believe, on setting, goes underground and sleeps; the waxing and waning of the moon are signs of the divine power's favour or displeasure. The stars, they quaintly observe, are so numerous that they do not know what to make of them.

As we leave Machako's and the mountains of Ulu, we see before us wide open grass plains with scarcely a bush or tree anywhere. These are the Athi plains, so called from several streams flowing north-east, which are the head waters of the Athi River. Away in the distance to the north-west, on a clear day, is visible a sharp outline of dark forest, the boundary of the Kikuyu country. These plains are a continuation of the great Kapite Plains stretching southward to the foot of Kilimanjaro. They are a sort of no man's land, and have been the scene of many a fight between the Wa-Kamba, the Wa-Kikuyu and El Masai, for they are generally all at enmity with each other. The Wa-Kamba, however, fight best in the hills, the Wa-Kikuyu in the dense forest, and the Masai in the open. Hence it is generally the Masai who graze their cattle and donkeys here till forced to move elsewhere by want of grass. Innumerable herds of game swarm on the plains, and the hippopotamus haunts the deep pools in the river-beds. The grass on these uplands is periodically burnt by the Wa-Kamba and Wa-Kikuyu, and then before the fresh grass sprouts, it is indeed a scene of black desolation. Even then the game swarms and is often more numerous than at other times of the year. These plains vary in altitude from 5000 to 6000 feet, and a perennial supply of water always exists in at least three of the main streams draining them. Rock outcrops are numerous, and frequent patches of lava-strewn ground denote a substratum of lava formation. Small swamps often occur where the rainfall is retained by rock close to the surface. The Athi River, which we have traced throughout its course, runs in a north-westerly direction to

the north of Donyo Sabuk or Chianjawi before turning to the south, and at the most northerly point in its course cannot be much more than 25 miles distant from the Tana River.

On these plains lions are always to be found. On one occasion twenty-three of these animals were seen together by Mr. Jackson; on another a caravan of twenty men was attacked by some fifteen lions, who played havoc with the loads thrown down by the porters.

Kikuyu is a wooded and mountainous district. It is a long but narrow strip of country, in width not exceeding 30 miles, and bounded on the west by the Kikuyu or Kinangop escarpment. At one time no doubt it was entirely covered by dense forest; but now so much has been cleared that the forest is almost confined to strips of 2 or 3 miles in width on either side. The country varies in elevation from 6000 to 8000 feet. It is a mass of long tapering spurs and narrow valleys, running generally from west to east. The flat tops of these spurs are often covered with clumps of forest, and in every valley rushes water. The scenery is varied and beautiful; at many places waterfalls are met with, which, though not of great size, are very attractive. Most of the streams rise in the swamps on the heights of Kikuyu escarpment, and form some of the head-waters of the Athi and Tana Rivers. The country is most fertile, and will produce anything. The grass and turf is as green and thick as on an English lawn, and has the same delightful springy feeling to the foot. Sugar-cane grows luxuriantly in the valleys; Indian corn, millet, and kimanga are much cultivated. In March, 1892, great havoc had been caused by locusts, but in August the second crop was very successful. English potatoes, peas, cabbages, tomatoes, beetroot, broad beans, cauliflower, and onions all do well, the rainfall being ample and the climate temperate. Everyone looks forward to reaching Kikuyu, if only on account of the excellent vegetables and delicious mutton with which you will be regaled at the Company's post of Fort Smith. The excellence of the grazing is proved by the condition of the cattle, sheep, and goats. The milk is excellent and sweet, as the vessels are kept clean. The timber is very fine and straight. Here in Fort Smith is the first house in East Africa built of burnt brick, and the cold is such as to render the fireplace quite a necessity to comfort.

The Wa-Kikuyu are allied to the Wa-Kamba; they are not, however, physically so well made. In character they are generally cruel and treacherous. Their neighbours, the Masai, complain of their twice having broken faith with regard to an old existing treaty, which allows the women of either race to trade with impunity, even when at war with each other. Masai women who have entered Kikuyu to buy food have been enslaved by the Wa-Kikuyu. The men are not so industrious as the Wa-Kamba; indeed, most of the work in the fields is done by women or women slaves.

The Kikuyu warrior is armed with spear and shield, sword, knobkerry, bow and poisoned arrows; but he is not fond of fighting, except in dense forest or bush, where their poisoned arrows are used with great effect. Parties frequently go out to fight the Masai, but apparently never succeed in finding the enemy. The warriors dress their hair into a number of small ringlets resembling pieces of string, a custom also adopted by some of the Masai. Their villages are composed of round, dome-thatched huts with timbered walls and projecting eaves. They are generally built on a spur-top in a clearing surrounded by dense forest. The entrances are frequently most complicated, formed of interlaced timbers, through which you have to crawl. They can be closed at a moment's notice by logs always kept in readiness. Granaries are built similar to the huts on a smaller scale, with the floors raised 18 inches above the ground. Each wife of a M-Kikuyu possesses one of these granaries, and has to take her turn in providing her lord and master with food. Periodical dances are held, where both sexes unite, and at which large quantities of pombe, an intoxicating drink made either of honey or sugar-cane juice, are consumed. Honey is abundant, and collected by wild bees, which swarm in hollow tree-trunks suspended horizontally to the branches of large trees. These same bees are often a cause of grief to passing caravans, for the slightest noise provokes the bees to attack, and a general stampede of man and beast is the result. The life of a man is valued at from fifty to two hundred goats; that of a woman at from twenty to fifty. It is curious to note the various forms of oath deemed most sacred by different tribes in these countries. A Kikuyu man will swear on the blood of a goat, a Masai on a blade of grass, and a man of Kamasia or Baringo on a stream of running water. In each case the goat, the grass, and the water is considered their most valuable possession.

After two short marches from Fort Smith through alternate forest and open grass, you will emerge on the edge of the great eastern escarpment which is some 370 miles from the coast. This escarpment, which runs nearly north and south from beyond Lake Baringo to far south of Ngongo Bagas, varies much in altitude and in character. The heights are in places clothed with dense forest, where elephant roam at will, and again are grass-clad with numerous small swamps. The fall is not precipitous as one would imagine from the use of the word escarpment—indeed there are several points where loaded animals can descend without great difficulty. By the caravan road the highest point crossed is 7200 feet. The fall of 1400 feet is made up of two main steps of 700 and 500 feet respectively. Between these two steps the slope is more uniform, though in the centre is a smaller drop of 100 feet. The slopes of the hill-side vary from $\frac{1}{2}$ to $\frac{1}{10}$, and are in places rugged and much intersected by small watercourses. The soil is composed of broken masses of igneous rock and earth, and the ground is generally

clothed with a growth of jungle-forest with occasional patches of grass. Further north towards Baringo, where it is known as Lykipia escarpment, it is composed of two or three ranges of hills intersected by many deep ravines. Magnificent views may be obtained of the great rift and lakeland 2000 feet below you. Two remarkable features to be seen in this rift are the extinct volcanoes of Suswa and Longonot—the outlines of both their craters being distinctly visible. Immediately at your feet is the valley of the Kedong—a stream which rises in the escarpment some 10 miles north, and flowing southward loses itself in swamps below Ngongo Bagas. The fall into this valley shows a general gradient of about 1 in 23. After crossing this river the track runs up the valley through Masai grazing grounds, and thence rises over the shoulder of Longonot to a height of 7400 feet. Here in the middle of the meridional rift we are at a higher altitude than on the edge of the escarpment. The country is covered with thin bush or at times is quite open. From this saddle an easy descent of 8 miles takes us to the shores of Lake Naivasha, which is 6300 feet above the sea, and the same level as Kikuyu Post.

This country lying between the two great escarpments of Kikuyu and Mau is not an open long valley as might be supposed. It is undulating and even hilly in many parts, as many as four distinct waterpartings traverse it from west to east. It contains four lakes and innumerable small swamps. Of these lakes Baringo is the most northern. It is fresh-water and lies at an elevation of 3300 feet. By far the greater drainage of the meridional rift is into this lake, which like the remaining three has no outlet. Some 60 miles south lie the two smaller salt-water lakes of Nakuro and Elmenteita. These are at elevations of 6025 feet and 6250 feet, some 3000 feet higher than Lake Baringo. Lake Naivasha is the furthest south of the four, and is slightly larger than Baringo. The shores of Naivasha are shallow, and the extent of the belt of papyrus reeds is generally a good indication of the shoal of water, as they do not grow in water more than 3 feet deep. Two islets, one small, the second larger and something like a horseshoe in shape, are situate at the south-east end of the lake. Large masses of weed growing in water 4 or 5 feet deep have been mistaken by travellers for additional islands. We found the water close to these islands deepen suddenly, as if into a deep circular pit, two sides of which are formed by the precipitous shores of these islands. The water up to the edge of this pit was nowhere more than 8 or 10 feet deep; but once past the edge we could find no bottom with our limited line.

This seems to prove that the lake now occupies the position of an extinct crater. Down to the edge of the water grows green mossy grass, with an occasional clump of mimosa thorn. Duck of many kinds, geese and crane swarm on the shores of the lake, and the grass-lands are tenanted by zebra and several kinds of antelope. The small Lake

of Elmenteita is wooded and rock-bound on the east, but comparatively bare on the west shores. Nakuro is surrounded by low bare hills covered with scanty grass. Between Nakuro and Baringo the country is undulating, in places covered with thorn scrub, elsewhere with long tangled grass. A noticeable feature is a succession of long rocky ridges, flat-topped, which run north and south. At two points warm springs are met with; the temperature of these is, however, not great, and never exceeds 95°. The shores of Baringo are swampy in many places, and surrounded with a thick growth of wait-a-bit thorn and flat-topped acacia trees. In the centre of the lake is a group of five islands—the largest of which is inhabited by Wa-Kwafi. Masai are generally to be found grazing their cattle to the north of Elmenteita and round Naivasha, moving from one to the other as the pasture gives out.

All this country, lying in the great meridional rift south of Lake Baringo, is one of the haunts of the Masai, kraals of whom are always to be found either round Elmenteita or Naivasha. So much, however, has already been written by other travellers on this race of warriors, that I only propose alluding to some of the changes that have taken place in their behaviour and manners. Formerly arrogant in the extreme in their dealings with Swahilis and Europeans alike, insisting on the due payment of hongo or toll as their right from every passing caravan, they have changed, and very much so, for the better. They regard a European with respect; they no longer force their way into his tent and ask him to take off his boots and show his toes. They credit him with supernatural power, and would never seek to delay him for purposes of their own. When a caravan camps near Masai kraals, a deputation of warriors with a Lygonani or captain and chief medicine man waits upon the leader of the caravan. They greet him courteously, ask whence he comes and whither he goes, what is his object, and what tribes he has passed through. They will then proceed to ask for a gift—not demand it—and longing eyes will be cast on any cattle with the caravan. Not succeeding in their request, the Lygonani will ask for medicine or charms by which he may be fortunate in his cattle-raiding, and failing in this he will say, "Well, at all events, you have travelled far and must have seen many cattle, tell us where you saw the most, so that we shall know where to go for them." When you describe a country where cattle are in numbers like blades of grass, "Tell us where it is," they will eagerly ask; and it is amusing to see the abstracted look on their faces when they learn it is the Suk country, for hitherto the Wa-Suk have proved too hard a nut for them to crack. Should any disturbance arise between the porters and the young Masai, a word to the Lygonani and the cause of complaint is at once rectified. They still despise the Swahili; but even they have in great part lost their terror of the once-dreaded Masai. No doubt their fallen estate is partly the cause of this change of bearing.

VIEW IN SOTIK.

Formerly the possessors of countless herds of cattle, sheep and goats, the disease, a species of lung ailment, has so reduced their flocks that where there was once plenty in the land, many—even Elmoran or warriors—have been and are reduced to eating the once-despised Kikuyu and Kamasia flour. Once they would eat nothing but beef or mutton; now they will accept with avidity the refuse of a carcase of even a zebra or antelope. Naturally this state of things has not reduced their raiding propensities, but it has made them more amenable to reason and lessened their pride. The Elmoru, or married people and children, are worst off; they are often met with in a starving condition, while whatever food is available is always at the disposal of the young warriors. On account of this want of food Masai children are often sold to Swahili caravans, others run away and of their free will throw in their lot with the porters, who to their credit generally treat them well and share with them their scanty portion of food. It is believed that a beginning might now be made if only proper steps were taken, and the right men got hold of, to secure the goodwill of these warlike wanderers, and to secure their assent to some scheme by which use could be made of their discipline and soldier-like qualities. Unfortunately little or nothing is known of them, and no attempt has hitherto been made to provide them with a sphere in life other than that of marauding. It is, however, known that they are willing to make treaties with the European, and it is also believed that they would abide by any such treaty they made.

The Mau escarpment on the western side of the lakeland is a much more serious obstacle than that of Kikuyu. It is not, however, a single well-defined mountain range, but rather a mass of hills, with narrow steep ravines running in every direction till they find an outlet down to one or other of the lakes. It has generally a higher altitude than that on the Kikuyu side. West of Naivasha one track crosses an elevation of 10,100 feet, and away northward the actual elevation gradually decreases, though as the great trough similarly has a fall of 3000 feet to Baringo, the actual climb is as great, or nearly so. West of Baringo the escarpment is split into two great ranges of Kamasia and Elgeyo. On Kamasia the route crosses an altitude of 6800 feet, into the valley of the river Ndo, you descend to 3600 feet, and then after a precipitous climb through lava cliffs the summit of Elgeyo, 7700 feet high, is reached. Between these two northern and southern routes an easier ascent from north of Lake Nakuro is obtained. From a level of about 6500 feet, the highest point of the escarpment, 8800 feet, is reached in 75 miles, though many ravines and water-courses have to be crossed, which pour their waters into Lake Baringo. By this road the escarpment is surmounted just south of the point where the two frowning ranges of Elgeyo and Kamasia diverge from the main range.

Let me now describe the most southern of these routes, which is perhaps the least known of the three. This route, known as the

"Sotik" route, passes through Sotik, Lumbwa and South Kavirondo to Ugowe Bay in the Victoria Nyanza. Passing along the southern shores of Lake Naivasha, through beautiful grass country with occasional clumps of thorn forest, where guinea-fowl swarm, we camp amongst some low, outlying, rocky hills forming the western shores of the lake. Right in front tower the forest-clad heights of Mau. A Masai cattle-track slants up the hill-side, and resembles a well-cut road, though in reality it has been worn so from time immemorial by the hoofs of countless cattle. The lower slopes of the hill are covered with bush and open grass glades. Where this road crosses there are two main ranges the lower of which has a height of 8900 feet, and is separated from the higher by an open grass valley running southward. The secondary range has an altitude of 10,100 feet above the sea, and 3800 feet above Lake Naivasha. The crests of these two ranges are clothed with dense forest and undergrowth. From every branch hang streamers of moss and grey lichens, tree ferns revel in the damp atmosphere, and everywhere is a great silence. Indeed on these heights few living things are to be seen—the track of a fox or hyena, or the occasional footpad of a leopard. An indistinct twilight prevails under the hoary old junipers, among which the wind soughs sadly. It is indeed a "forest primeval," a mass of decaying vegetation, of moss-grown trees and long rank grass. The hill sides are composed of tuffs and volcanic debris, the higher range of softer soil, with but few traces of rock. The ascent is steep—to the lower range the section shows a rise of 2200 feet in 5 miles, while the higher range is reached by a climb of 900 feet in about 1100 yards. From the summit a glorious view is obtainable of Naivasha and the volcanic cones surrounding it. It is chilly, even very cold at nights on these heights. The atmosphere is damp, and seldom before nine o'clock does the sun succeed in dispersing the dense grey mist, which, hanging like a pall on forest and grass, drenches you as effectually as heavy rain.

At this point the forest is but of small extent; after marching 1¼ miles from the summit, the track emerges on to open grass, and a fine view to the westward is obtained. At first sight you would describe the country as rolling. It is a series of long narrow spurs separated by ravines. These spurs and ravines slope away gently to the south and south-west, lying outstretched like the fingers of a giant's hand, and culminating in a series of heights rising to the north of where you stand. The forest we have passed through has a much greater width northwards, as the dark line on the horizon denotes. But this open grass country is very deceptive. The ravines you will see are far deeper than appeared at first sight, and at the bottom of each is dense juniper forest. The spur-tops are generally open long grass. Marching westward, the first camp is at the bottom of a ravine with a descent of 1300 feet in 5 miles. Thence onwards for eight or nine marches, the section

will show an average rise and fall each day of 1200 feet. From the summit of Mau to a point on the same level as Naivasha, two ravines over 600 feet deep are crossed, four are over 400 feet, and four over 300 feet. Indeed, from the general slope of the country, all the drainage from the heights of Mau has to be crossed on our westward march, and there is no possibility of evading these. A somewhat more northerly route by Mr. Jackson and Mr. Gedge shows the same drainage crossed, though naturally the ravines are not so deep they are very much more numerous. Further to the south are large tracts of forest through which we have to plunge. A guide is very necessary to travel over this road, as although wherever there is forest or bush the path is easy to find and keep to, in the open country there is little or no vestige of road through the long grass, and if on entering the next patch of forest we did not strike the path again, we should be hopelessly lost and have to cut our way at a very slow rate of speed. I know nothing more tiring than this cutting one's way through interminable forests and bush, especially over swampy ground in wet weather. Even where the path is followed in the rains through these forests our average rate of speed was often not more than a quarter of a mile an hour. The path has never been properly cleared, so that the branches hang very low and obstruct the porters; twisted tree trunks and roots traverse the way in every direction, like a Brogdingnagian matting, and the interstices are filled with muddy slush, the ascents and descents often precipitous, and the streams, though seldom deeper than 3 feet, are very rapid and dangerous to cross. For eight days marching from the top of Mau no living being is seen except an occasional band of Wandorobbo hunters. Formerly these spurs and valleys were occupied by the Wa-Kwafi, at one time a numerous and powerful section of the Masai, and like them rich in cattle, sheep, and goats. But they have been almost exterminated by the Masai, and but few of them are to be met round the southern shores of Lake Baringo, where they now make their livelihood by agriculture. Traces of their occupation are, however, numerous, in the long-deserted remains of kraals, and the blackened juniper stumps which remain still standing as evidence of their yearly grass fires. There is fine grazing throughout, clover and food grasses grow luxuriantly; but the timber as a rule is not of much value. The English bracken fern grows in profusion from a level of 8200 feet downwards; but we did not see it at higher altitudes. The climate is almost European—cold and bracing at nights, and not unpleasantly warm in the sun. Throughout this distance of 75 miles from Mau the soil is composed of purple lavas, volcanic mud, ash, and tuffs resting on quartzite and gneiss; and the volcanic overflow seems generally to extend for this distance and no further, though traces are to be found further west of volcanic rock. By road we are now 100 miles from Naivasha and about 500 miles from the coast.

The Wandorobbo, who may occasionally be seen in this otherwise deserted country, are a small tribe much scattered, and to be found generally only in the pathless forests. They are very shy and cautious in their dealings with a caravan, perhaps from fear of the Masai, who are their masters to a certain extent. Swahilis can only obtain communication with these dwellers of the forests by following them to their villages in small numbers and with great precaution. They, the Wandorobbo, are skilled hunters, and their livelihood depends on their success in the chase. They never cultivate the land, nor keep flocks. Their villages are generally very small and difficult to find. They barter the ivory they obtain from elephants for beads and wire, and subsist on the flesh of every sort of animal they kill, from the elephant to the antelope. They are armed with the bow and poisoned arrows, and a peculiar heavy-headed spear 7 or 8 feet long, the head of which is poisoned, and being loosely fastened is easily detached. They manufacture for the Masai their buffalo-hide shields, and often act as intermediaries between them and the Wakikuyu in the purchase of food. The language is a dialect of the Masai, and very similar to it.

Passing through this deserted forest and grass country, we saw little or no game except rhinoceros. But apparently during the dry season hartebeest, eland, wildebeeste, and various sorts of antelope are to be found in numbers, and formerly large herds of buffalo. Here I may mention that throughout the expedition no member of the Survey party was fortunate enough to see a single buffalo, and only on two occasions were tracks of this animal met with—in one instance near the top of Elgeyo, and again just before entering Sotik. Wa-Kwafi and Masai I have questioned again and again assert that none are now to be found. Rhinoceros on the other hand are found in large numbers; on one march between the hills of Sotik and the River Niro we counted twenty of these huge animals, and no doubt there were many more, as the leading porters in two instances nearly marched over three of these animals as they lay asleep in the long grass; and for many days afterwards rhinoceros meat, not always very fresh, was the staple food of the caravan.

Sotik is a very hilly, almost mountainous, country, composed of ranges of hills running in a north and south direction. There are two main ranges of hills known as Likuto and Elmilan, and they form, as far as one could judge, a water parting between the drainage into Lake Victoria Nyanza, and that just crossed which appears to flow in a southerly direction towards German territory. It is difficult to speak with authority on this point, as the forest growth is so dense, and the view during the rains generally so cloudy that an accurate opinion is difficult to form. But if this is not the case, and the drainage of such streams as the Savmei, Na Erok, and Niro, finds its way into the Victoria Nyanza, it must be by a very circuitous route through German

territory and not by the Kosove Valley, through which the drainage of Sotik and Lumbwa falls into Ugowe Bay. These hills of Sotik are of crystalline formation generally, and numerous outcrops of gneiss and schist will be observed on the route. I may mention here that the route followed by the Railway Survey party through Sotik and Lumbwa was that first traversed by Major Eric Smith and Mr. Neumann of the I.B.E.A. Company's service. No inhabitants are met with on this first march, the track passing through dense forest growth; amongst the juniper and mimosa trees are to be found specimens of cedar, though of no great size. The Lkonono, a large rapid stream, 70 or 80 feet wide and 3 or 4 feet deep, is crossed, and the track throughout is exceedingly bad, the soil being black adhesive clay, and constant cutting was necessary to enable the loaded porters to get through the forest. Two days more marching brought us to the further edge of Sotik. The country is more open, large clearings on the hill-tops and sides of the valleys denoting extensive cultivation. The track crosses and re-crosses several mountain torrents, the principal being known as the Enumnu-tungi River, and the valleys have steep sides and in direction are very erratic. Villages composed of clusters of from two to four huts generally are built on the hill-tops in the centres of clearings, and as a rule have no enclosure or wall of any sort. The clearing of the forest is done in a way similar to that practised by the Wa-Kikuyu and Wa-Kamasia. The undergrowth and jungle is cut away by hand, and a fire lighted round the stumps of all the larger trees, which, after their fall, are left to cumber the ground and decay away, only the small undergrowth being dug up. Sometimes the trees are cut down by hand and the whole network of undergrowth and branches left for a year to dry, and the whole mass is then set fire to; but the tree-stumps are always left in the soil; it being considered less trouble to clear more ground than to uproot these. In the centre of this Sotik country we came across a caravan of Swahili traders belonging to Jumbe Kimameta, who had established themselves in a strong palisaded camp, and were engaged in the purchase of ivory. This is the custom of these Swahilis to establish a strong head-quarter camp, and send out parties of men into the surrounding country to barter their trades goods for ivory. It is a long operation, as often a whole week is taken up in the purchase of one tusk, and the business is one requiring an infinite amount of patience. In some instances, such as the Nandi country lying to the north of Sotik and Lumbwa, the Swahilis have to trust the Wa-Sotik and Wandorobbo with trades goods and send them to purchase the ivory, as the Wa-Nandi will not allow the Swahilis into their country. Whilst these parties are out the remainder in camp purchase food for their return and pass an ideally lazy existence. The Wa-Sotik cultivate apparently nothing but whimbi, a cereal with a very small, round, dark-brown seed, which is easily converted into flour

and is not unpalatable. Very excellent and cheap honey is obtainable in large quantities. The Wa-Sotik possess cattle in small numbers, and large herds of sheep and goats, which find excellent pasture all the year round. The soil is apparently extremely fertile. As the people of Sotik, Lumbwa, and Burgani, are all closely allied, I propose speaking of them together.

The country of Lumbwa is not so mountainous, and almost entirely free of forest. It is generally similar to what I have described between Mau and Sotik, a series of ridges and ravines. The ravines are, however, not so deep, and the ridges are almost flat-topped. It is extremely well-watered by many large streams. Of these we had to bridge one, the River Enumnutungi, forming the boundary of Sotik and Lumbwa, and were preparing to bridge another when we fortunately found an existing native bridge of which we availed ourselves. Many of the valleys are so flat that the water forms a series of swamps sometimes 200 yards broad; these swamps being connected by rapid streams, this tends to show that the rock formation is a succession of horizontal strata in the form of steps. The country is covered with rough scrub, bracken-fern, and patches of open grass. Red and white clover grows luxuriantly, and the pasture is of the finest description. Large flat-topped acacia thorn trees are studded all over the country, but no other trees of any size. Further north, for we are now moving in a due north direction from Sotik, the country is quite open, and few or no thorn-trees are to be seen. Three marches take us to the borders of Burgani on the River Kivitoi. The country of Lumbwa is populous, much more so than Sotik, and it is surprising how the inhabitants can spare sufficient food to sell to caravans, as the cultivation does not seem correspondingly greater. Whimbi (*Elusine*) again is almost the only cereal cultivated, though small patches of mtama sorgum are to be seen. Pumpkins are grown in large quantities, and some few ground nuts were brought in for sale. Large herds of sheep and goats grow fat on the fine pasture, and cattle in considerable numbers are kept. The rainfall must be very considerable; from our experience I should estimate it as 50 to 60 inches a year. The cultivated fields are generally enclosed by a thorn boma or rough fence.

The country of Burgani presents the same physical configuration as Lumbwa, a series of valleys and ridges, till a high plateau is reached overlooking the valley of the Nyando River in South Kavirondo. But instead of the flat-topped acacia trees which are a noticeable feature in Lumbwa, the country is almost bare of shrub or tree. Thick bracken scrub and grass, for the first time since leaving Naivasha euphorbia growth is seen, and in one or two places the pleasant green patch recognisable from afar as a banana grove. Patches of whimbi cultivation, more extensive to the north than southward, and numerous villages denote a fairly large population. The strata are of schist and quartzite, overlain

sometimes by volcanic ash, and again by red clay. It is a country of even smaller extent than Sotik or Lumbwa, as one can traverse its width in two average marches. The high plateau referred to is covered with 8-foot elephant grass, and from this vantage ground we obtained our first view of the great lake. It was a dull day, and the nearest shores were 20 miles distant and 2000 feet below us, so that this first view of the inland sea was not very impressing—only a dull, grey level patch under the horizon, but the porters greeted it with shouts of "Nyanja, Nyanja tena," and brightened up wonderfully at the thought of being so near the flesh-pots of Kavirondo and Usoga. The fall from this tableland is steep and precipitous, and the going very bad. There is no path and the hillsides are covered with long tangled grass, in which lurk unseen loose stones and boulders of all sizes, which are a cause of infinite grief to the heavy laden men, so that much relief was experienced on gaining a valley in which a tolerably good path led us into camp. The fall is 1400 feet in 6 miles, the worst piece of the descent being one of 650 feet in 2 miles. Here in camp, at the foot of the Burgani plateau, we are on the borders of S. Kavirondo, by road 160 miles from Naivasha, and some 560 miles from the coast.

The people of Sotik, Lumbwa, and Burgani, and those also of Nandi, an inhospitable mountainous district lying to the north-east of Burgani, are all nearly allied. In appearance they resemble the Masai more than any other of the tribes we have passed through, and do not belong to the Bantu family. Of shorter stature than the Masai, the men and women are models of symmetry and grace. Indeed we considered them physically the best-proportioned types of East African savage we met. The faces of both men and women are well-formed and pleasing, and they do not wear the truculent and ferocious expression adopted by the Masai; but like all savage tribes the women age rapidly and lose their good looks. They have a bad reputation for thieving and treachery, and in one instance after leading a caravan on a wrong road attacked them by night. But throughout our march they gave us little or no trouble, except in a single case where they tried to extort payment for guides before these had done their work. At several places they were exceedingly friendly, and it was no uncommon thing to see loads being brought into camp by Wa-Lumbwa or Wa-Burgani who had struck up a friendship with the porters *en route*. They willingly brought in flour and honey for sale, and the Swahili were constantly joining in their dances and merriment. Through the Nandi country no caravan has penetrated; twice Swahili caravans have tried but have experienced so much opposition that they have had to beat a very discomfited retreat. They are the terror of their neighbours in South Kavirondo, and are constantly harrying and raiding them, and the Wa-Nandi are even treated with much respect by the redoubtable Masai. The language of all these peoples is a dialect of the Masai tongue, and

this latter is generally understood amongst them. No doubt formerly, and to some extent even now, Swahili caravans are accustomed to carry off children as slaves from the Lumbwa and Wa-Burgani, for several times on the line of march we would come across a large body of men sitting down in full war-paint on some commanding open space near a village, and in reply to our question of what they were doing, the answer was, "We are taking care you don't carry off our young men and women." The men wear a cape over their shoulders of colobus monkey or mole skin, and often a large spade-shaped piece of goat skin hung round their waists from behind; but many go quite as nature made them. They affect necklets of iron wire and iron chain, and wear coils of iron wire round their arms and legs. They are armed with a spear, and sometimes bow and arrow; but these latter, as far as we could judge, were not nearly so common as reported. Many of their spears are of Masai manufacture and shields also. These Masai shields and spears they obtain from Swahili traders in exchange for ivory, a large trade being done in this line. They are fond of daubing themselves with red clay from head to foot after the fashion of the Masai. The women wear a distinctive dress according as they are married or unmarried after the custom of the Wa-Kamba, and are fond of iron wire, iron chain, and black bead ornaments. The married women allow their hair to grow into the scrubbing-brush appearance adopted by the Masai women and others. They are very fond of ear ornaments, and extend the holes in their ears by using successively larger round pieces of wood—sometimes a single long piece of wood is thrust through the lobes of both ears at the back of the neck.

They are very superstitious, and regard anything they do not understand with great terror, such as fireworks or a burning-glass. At one place we were confronted with six men who wore hideous masks, half their bodies being concealed by a large curtain of loose fibres hung on a yoke-like stick fastened above the mask, who were extremely astonished that we did not at once turn tail and bolt in terror caused by their appearance. It is amusing to see the men greet each other in the English fashion by shaking hands, and to see a man and his sweetheart walking about with their arms entwined round each other's waists. We noticed only one lame boy, and not a single mis-shaped man, woman, or child throughout the country.

The climate is very salubrious and equable, the altitude varying from 6000 to 7500 feet. As I have mentioned little else is grown but whimbi, which is the staple article of food, but as few caravans pass through these countries, the people have but little inducement to make more use of the generous soil and fine rainfall they are blessed with. The grazing is really magnificent, and from all accounts is perennial.

In the camp at the foot of the Burgani plateau our four guides from Lumbwa deserted, without even so much as waiting for their present.

This we were greatly astonished at, and could not understand the reason till the next day, for they were on the borders of their own country and protected by a caravan. However, we found out subsequently that these guides were implicated in an attack and raid lately made on a Kavirondo village, and were afraid to even spend a night within 10 miles of their enemies, so decamped immediately without waiting for payment. A tiresome march up on to another ridge through long grass and loose boulders, and we could see the large Katch kraals away in the valley below us. These were hailed with delight, for we thought of the fowls and eggs, Indian corn and sweet potatoes we should once more be able to purchase; but we were doomed to disappointment. As we descended into the level grass valley, we passed through fields choked with weeds, and an unwonted silence met us instead of the cheery shouts of welcome and friendship we had been looking forward to. Nearer and nearer we approached to the huge villages, and not a soul was to be seen—no grazing herds or a sign of life anywhere—all were deserted! It was a blow, as we had hoped to replenish our stock of food, now well-nigh exhausted. These kraals are of enormous size—indeed, nowhere did we see such a number of huts in a single enclosure. A dry stone wall some 8 feet high surrounds each village, the entrance through a doorway with a wooden lintel overhead. Inside the walls all the huts were standing, round in plan with grass dome-shaped roofs, the walls sometimes made of mud, or of stone and mud. Domestic utensils of all sorts lay scattered about amongst the weeds, and signs everywhere of an unpremeditated flight. A small stream known as the Katch River flows through the valley, which is much strewn with loose stones of all sizes, the soil being generally of the description known as black cotton. We camped some 2 or 3 miles beyond these deserted villages in bush country, and at last came across a strange creature who was looking after some goats. He told us that one night some six months before the people of Lumbwa and Burgani had attacked the Katch kraals, carried off all the cattle, sheep and goats, and in many cases closed up the entrances to the huts, the inmates being asleep, and set fire to them. The Wakavirondo apparently were completely taken by surprise, and made no attempt of any sort at resistance. Many men, women, and children were killed, and those that had escaped had gone westward to the shores of the lake. The man told us there were some small villages in the bush near, and eventually we managed to get a little flour, and, what was very delightful, some fresh milk. I should estimate that the Katch kraals must have contained at one time at least 5000 inhabitants. The next day we marched across an open swampy plain, with numerous villages, to the west, the people accompanying us on the march and showing everywhere most friendly intentions. Through this plain flows the Nyando River into Ugowe Bay; this river in May is some 60 yards wide and from 4 to 6 feet deep, with a current of about 4 miles, so that we had

some difficulty in getting across. The waters of the Nyando come from the Nandi hills to the north-east, and from the uplands of Burgani and Lumbwa to the south-east. It is curious in that it apparently changes its course occasionally in flood-time, as subsequently two former beds, now almost dry, were pointed out to us by the natives. To the north and north-east of this fine open valley rise the rugged hills of Tiriki and Nandi, and to the south-east and south those of Lumbwa and Burgani. The valley lies at an elevation of from 3900 to 4300 feet above the sea, the Nandi Hills having a height of from 2000 to 3000 feet above the plain. Along the right bank of the river are numerous villages and magnificent cultivation. Here the Wa-Kavirondo villages are generally surrounded by a high enclosure of euphorbia, and no more do we find stony ground but rich alluvial deposits of loam and clay soil.

The mtama cultivation is the finest I have seen anywhere. Much of it is 12 and 14 feet high, and marching through it you will be astonished at the fertility of the soil that produces such a growth. In addition to mtama cultivation there are masses of mahindi and whimbi, many different sorts of pea and bean, sweet potatoes and mahogo (cassava), pumpkins in profusion, and further to the north-west bananas. The natives swarm into camp with fowls and eggs, fish and goats for sale; and the Swahili porter is in a veritable land of milk and honey. As usual in such cases, he overeats himself, always wishes to halt and eat more, and withal is entirely contented. The head chief of these parts—Kitoto by name—sent his two brothers and his son with a present of a sheep and a goat; he himself was engaged in building a new house, and could not come. A return present of brass wire and white beads was much appreciated. Thence to the shores of the lake at Ugowe Bay we passed through the same rich soil and cultivation, portions of the march during the rains being somewhat swampy from the flat character of the country. The eastern portion of Ugowe Bay is very shallow, so much so that we were told by Wa-Kavirondo that round the mouth of the Nyando you could walk for several miles before reaching water 6 feet deep. The water on the northern shores of the bay is deeper. The growth of papyrus is generally a very good indication of the extent of shoal water. The papyrus does not appear to grow in water more than 4 feet deep; and according as the belt of growth widens or narrows, it will generally be found that the water shoals slowly or rapidly. We launched our 12-foot Berthon boat on the bay, and took many soundings round the coast, and eventually found one reach of the shore where a depth of 6 feet of water was found at 20 to 30 yards from the water's edge, and a suitable landing-place and anchorage for light draught steamers. From many inquiries made of the Wa-Kavirondo fishermen on the shores of the bay it appears that the water is always higher in the evening than in the morning, generally from 3 to 6 inches. This is no doubt caused by the evening lake breeze, which never blows at night

or in the early morning. They further told us that the maximum rise and fall of the water was about 2 feet, which would be caused partly by a strong wind, and partly by much rain. This maximum rise and fall was of rare occurrence. Crocodile and hippopotami swarm in the lake, and at least four different varieties of excellent fish; but, curiously, there are not many duck or geese to be seen on the water, though divers are common. The Wa-Kavirondo are skilled fishermen, using draw-nets and floats, weirs and baskets with much success. Indeed, throughout the country there are recognised market-places, some 10 miles from the shores of the lake, whither long strings of men, women, and children every day carry their baskets of fish, and barter them for bananas, mtama flour, and other produce. Marching northward from Ugowe Bay, the country is hilly, and its physical features somewhat similar to those of Kikuyu—ridge and valley, with numerous large streams which rise from the hills of Tiriki and the tableland of Nandi. Most of the country between Ugowe Bay and the Nzoia Valley is profusely cultivated and thickly populated. The villages are sometimes surrounded by a mud wall and deep V-shaped ditch outside, which is used as a reservoir for water, and sometimes simply concealed in a patch of high elephant grass, and entirely lost to view. Further northward we noticed numerous villages and no signs of fields or cultivation anywhere. On asking the reason of this they said that elephant were numerous to the east of their villages, and at night came down and destroyed their fields, so that they had been obliged to cultivate land further to the west, 5 miles off. Many of the streams are bridged very cleverly by suspension bridges made of tree creepers fastened from tree to tree on either side; but they are not very strong, and we were generally obliged to use our boat to ferry the loads over.

The people of Kavirondo are deserving of some notice. Their appearance and get-up has been described by Captain Lugard, and their total disregard of clothes. Physically they are tall, but often ill-made for their height, with no chest or limb development corresponding to their stature. They have the negro type of face, with large mouth, thick, protruding lips, and prognathous jaws. They are not a warlike race. Their spears have very long shafts and small, badly-fastened iron heads, which are nearly always rusty and dirty; their shields also are ill-shaped and ill-made. As a rule, they carry no weapons of any sort, but a pointed stick; and when once they have ascertained that a caravan has no ill intentions, they swarm into the camp entirely unarmed and unclothed, and show most friendly feeling. I am speaking more particularly of the people of South Kavirondo, which is less known than North Kavirondo. Mr. Jackson reports these people to have been treacherous and great thieves; but if this was the case in 1889–1890, they have much improved for the better. They are apparently hard-working and industrious. According to their proximity

or otherwise to the lake, they are either fishermen by trade or agriculturists. The highly-cultivated and well-cared-for fields denote a knowledge of agriculture and industrial habits that compare favourably with other savage tribes. They are very ingenious and clever in making basket-work, and ensnaring quail and other small birds, and, as has been mentioned, are highly skilled in the use of the fish-net and basket. They have fine herds of cattle, sheep, and goats, but have no encouragement to increase their flocks, which are always a great attraction to their more warlike neighbours of Nandi and Lumbwa. This is the case throughout East Africa. A want of protection from stronger and better armed rivals is a great deterrent to the increase of cattle in a weaker and more peaceable district; the possession of cattle is generally merely an advertisement for a raid. In North Kavirondo, along the shores of the lake, between the mouths of the Sio and Nzoia Rivers, the people are skilful in smelting iron ore brought from the hills of Samia. From the iron they make iron wire, spears, hoes, and numerous other small implements; and it is curious to observe that similarly to the silver-workers in India, this ironware trade descends in families from father to son.

The Nzoia River, which with its tributaries drains the upland plateaux of Nandi, Elgeyo, and Kabras, is perhaps the second in point of size of the streams that feed the Lake Victoria Nyanza. It has formed for itself a small delta at its mouth, through which the waters wind their way in numerous channels to join those of the lake. The drainage from Mt. Elgon does not join the Nzoia River or flow into the Lake Victoria but goes direct to the Nile.

It will be unnecessary for me to add more to this paper on the subject of the fertile countries of Usoga and Uganda, as these have been lately described. Nor is there space to touch upon the other routes which have been traversed by the Railway Survey parties.

With regard to the relations between the Survey parties and the various tribes, it may be well to state that, notwithstanding prognostications to the opposite effect, these were friendly throughout the work, and that it was never found necessary to use firearms except to repel the inquisitiveness of rhinoceroses, or in the pursuit of game for the pot.

In conclusion I would say that Captain Macdonald, who is now in Uganda, was the leader of the expedition till near the close of the field-work. It is due to him that the Survey operations have been successfully carried out. I am indebted to him for notes on many points of interest, which I have made use of in this paper.

THE ANCIENT TRADE ROUTE ACROSS ETHIOPIA.

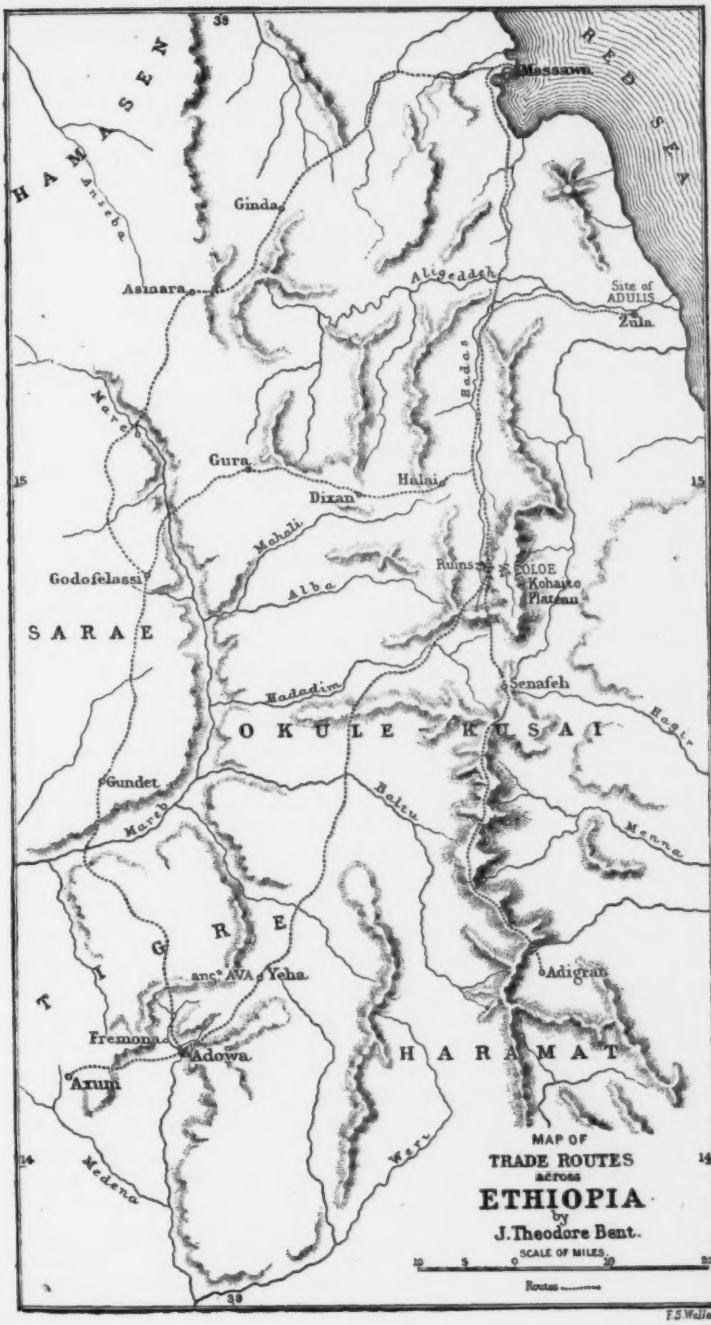
By J. THEODORE BENT.

ADULIS, the modern Zula, was the port of one of the great trade routes which led into the interior and eventually came into the Nile valley at Meroe. It is about 20 miles south of Massawa on the Red Sea, about 2 miles from the shore, and is represented now by a number of mounds covering buildings which have been hidden by the accumulation of soil washed down by the adjacent river, which is now entirely silted up. The few traces of architecture still to be seen point to a late period, probably not more than a century before Christ. As for the great Adulitan inscription, it has long since disappeared, and probably lies buried in one of the mounds. Luckily for us, it was copied and its authenticity is undoubted, and it forms one of the most valuable aids we have in deciphering the ancient geography of Abyssinia.

Ancient geographers are scanty in their information about this part of the world. Strabo knew nothing of Adulis. Pliny knew it as the emporium for ivory, skins and products of the interior, and the port of Ethiopia Troglodytica. The author of the 'Periplus' was better informed, and knew also that Adulis was the port of Axum, the capital of this portion of Ethiopia.

Both Ptolemy and the 'Periplus' mention the town of Koloe as the first place inland after Adulis; the 'Periplus' tells us that it is three days from Adulis and five from Axsum. Lejean imagined that it therefore must be near Halai, the first village on the high plateau on the road to Axum. Salt considered Dixan to be the spot, distant about three hours from Halai. When we visited these villages I searched everywhere for ruins, but found none. However, at Halai we heard of extensive ruins on a high and isolated plateau called Kohaito, so we determined to pay them a visit; and there can be no doubt that these ruins mark the site of the old town of Koloe, for they are very extensive and exactly where they ought to be, namely, three days from Adulis and five from Axum, and there are no others within an area of many miles.

The high plateau of Kohaito is a very curious formation, being a long isolated mountain with a flat top like Table Mountain, 7000 feet above the Red Sea. It is most difficult to ascend, being surrounded by precipices; but the way by which we approached at the southern end, and the way by which we descended about half-way down the western side, offer ample traces of old roadways. In difficult places the rocks have been cut; walls of sustentation are visible at many points; but boulders have fallen and trees grown up, which make the ascent now exceedingly arduous. The ancient ruins are exactly in the centre of the high plateau, by the side of a stream, which has eaten away a curious low valley right down


RED SEA
HAMASEN
Massawa
Ginda
Asmara
Aligeddeh
Site of ADULIS
Zula
Gura
Halai
Dixan
Ruins
COLOE
Kohaito
Piazzan
Godofelassi
SARAE
Senafeh
OKULE-KUSAI
Gundet
Adigrat
TIGRE
anc. AVA
Yeha
Fremona
Adowa
Axum
HARAMAT
MAP OF
TRADE ROUTES
across
ETHIOPIA
by
J. Theodore Bent.
SCALE OF MILES
Routes
F.S. Waller

the middle of the plateau. They cover a very large area, and there are columns of several temples still standing which give us exactly the same form of architecture as those to be seen at Adulis, and obviously connect the two places together. Probably Koloe was a summer residence for the inhabitants of Adulis, possessing as it does a magnificent climate and absolute immunity from attack. The chief feature however of Koloe is a large lake or reservoir in the centre of the town which was supplied by the above-mentioned stream, and which was shut off along one side by a very fine dyke or wall of obvious Hellenic structure, with two sluice-gates which have fallen into ruins. This wall to keep back the water in the lake is 219 feet long. The centre part between the sluice-gates is the strongest, and is built with stones 5 feet long and 1 foot 6½ inches high, entirely without cement, but with slabs between each course and throughs inserted so as to form a zigzag pattern, and each course recedes a few inches the better to withstand the force of the water. Altogether this dyke at Koloe is one of the most interesting remains I have ever seen of ancient engineering skill, and except for the sluice-gates is still in an excellent state of preservation.

It is a curious fact that Ptolemy mentions after Koloe another place called Koloe palus, or the lake of Koloe. Ptolemy himself evidently believed it to be further inland, and geographers who have discussed the question have imagined it to be the Lake Tzana or Dembea beyond Gondar. It certainly would be a curious fact if the Greek name of Koloe occurred so far inland, and no other geographer gives it. Stephanus Byzantius calls Lake Tzana Ψέβω, and I think the most likely solution is this—that Ptolemy heard of Koloe, of which he knew the position, and also of the lake at Koloe, the distinctive feature of the place, but, not knowing that the places were identical, he placed the lake further inland. At any rate, the identity of names and the existence of this very remarkable lake on the high plateau at Koloe make this a very likely supposition.

At the foot of the plateau in the valley below, where we descended on the western side, there are the remains of a large ancient village, with the columns of a temple in the midst of the same class of architecture as those at Adulis and Koloe. Doubtless this village was on the great trade route inland, and served as a place of halt for the caravans at the foot of the hill on which the town of Koloe stood.

Three and a half days' journey inland towards Axum the traveller reaches a village now called Yeha, which is built on the ruins of an extensive town, and has in its midst a magnificent piece of ancient architecture preserved to us from the fact that it has remained a church and monastic establishment down to the present day. Alvarez, the Portuguese ambassador, describes it in 1520 as the convent of Abba facem. "Near the church is a very grand and beautiful tower, remarkable not only for its well-proportioned height as for its thickness

and excellent masonry, but it has already begun to fall into ruins, though built of very strong stone, covered and enriched with such excellent work that it looks as if it were nothing less than a royal palace such as I have never seen another like." Alvarez also tells us the current Abyssinian legends that it was the place to which Menelek, King Solomon's son, brought the ark, and that it was subsequently the residence of Queen Candace.

We stayed there (February 1892) two days to take photographs and study the surroundings, and found many traces of interesting architectural buildings which space will not here permit me to describe. We found also seven Himyaritic inscriptions of the best period of Sabæan work, which are at present being deciphered by Professor D. H. Müller of Vienna. The existence of this strong Himyaritic temple and town in the centre of Abyssinia is a very strong proof of the Sabæan origin of the Ethiopian empire. In fact, we may take it that the backbone of the early Ethiopian power came from Arabia, and the race still, though degenerate and mixed with negroid blood, have amongst them the type of their origin. I hope subsequently to describe more fully the temple and ruins of Yeha; at present I will confine myself to a few geographical points in connection with it. I thought it curious that such an important town as this must have been should be unnamed by any ancient geographer, but on searching into the question more minutely I think I have arrived at a very likely solution of the difficulty.

A scrap written by Nonnosus, ambassador from the Emperor Justinian to the King of the Axumites (522 A.D.), gives us the information that at "a spot called Ave"—Ave is between the cities of Axum and Adulis—"we saw a great quantity of elephants, about five thousand" (Nonnosus 'Photii Biblioteca'). Then we must turn to the Adulitan inscription. Many authors who have discussed this stone believe the second part to be later than the first, which recounts the victories of Ptolemy Euergetes. However, without the original it is impossible to speak definitely. Certainly the victorious monarch came from without, and began his victories at Adulis, and gradually went inland. First he conquered some towns near Adulis, then "*he crossed the Nile*," which words commentators have supposed to be interpolated as they presently occur again; then he conquered Ava and various other places in that vicinity. Now Yeha is only 12 miles from the Mareb, a branch of the Nile, and would naturally be the first place he would come to after crossing that river. Modern geographers unaware of the existence of ruins at Yeha have imagined it to be Adowa, a place about five hours from Yeha, where there are absolutely no traces of ruins earlier than the Portuguese; but joining the evidence together, it seems clear that the Ave of Nonnosus, the Ava of the inscription, and the Yeha of to-day, are identical.

Furthermore, the Adulitan inscription does not mention Axum at

all, but accurately describes the second crossing of the Nile (the Tacazze), the conquest of the kings of Simoen, and the deep snows on these mountains, which we also saw from Axum with our own eyes, and several other points which undeniably prove accurate geographical acquaintance with the district. Hence it seems fair to argue that Axum, which was known to all subsequent geographers as the capital of the district, did not exist when the inscription at Adulis was cut, but that it sprang up later under the influence of the Ptolemies, as the monoliths and architectural features of the place testify.

The ruins at Yeha are undoubtedly older than those at Axum, erected by the earlier Sabæan occupants of the country. There are Himyaritic inscriptions at Axum of which I brought impressions of three, but they are later than those from Yeha. Consequently it would seem that Ava was destroyed and Axum took its place as capital of Ethiopia Troglodytica during the reigns of the Ptolemies; this will account for the omission of the name of Ava in the earlier geographers, such as Pliny, Ptolemy, and the 'Periplus'—the name possibly survives in the Aualitic Gulf. Ptolemy says (4, g.): "The whole coast which is near the Arabian and Aualitic Gulf is called Regio Troglodytica as far as Mount Elephas, in which live the Adulites and the Avalites." Also we read that the Avalites were great importers of myrrh into Sabæa, from whence it was imported into Europe. Hence we may suppose that prior to the Greco-Roman occupation of Adulis the whole of this district was occupied by traders from South Arabia who exported "gold-dust, ivory, leather, hides, and aromatics," for the Sabæan markets, and that their capital was at Ava, the modern Yeha, for it is quite clear that no more extensive remains of this Himyaritic occupation occur elsewhere. Since writing the above, Prof. D. H. Müller has sent me positive proof of this theory, as he reads one of the inscriptions we found at Yeha thus: "*his house Awa.*" This Prof. Müller connects with the worship of Baal-awa, common in Southern Arabia, and thereby he supplies us with the key, not only to the ruins of Yeha, but to the more recent ones of Axum.

A curious fact came before our notice when at Yeha. Here alone, within the frontiers of the Abyssinian empire, did we find prosperity and agricultural pursuits in active progress, owing to the disturbed state of the country. The narrow valley here is one rich garden, the fields being watered with conduits and bearing rich crops; and the reason for this was given that there are numerous caves in the mountain exactly above Yeha into which the inhabitants drive their cattle and deposit their grain when threatened by bands of marauders. If, then, Ava was the capital of the Regio Troglodytica it is not at all unlikely that Troglodytes, or cave-dwellers, got their name from this very fact. Agatharcides tells us that the Troglodytæ were cave-dwellers, "shepherds with separate chiefs and princes of tribes. Their habitations

were not merely clefts in the rocks, but carefully-wrought vaults laid out in cloisters and squares, like the catacombs at Naples, whither in the rainy season they retired with their flocks and herds." From this it would appear that the ancients looked upon these people as not altogether devoid of art and civilisation.

Professor Sayce has lately discovered from Egyptian hieroglyphics that the name was originally Trogodytes into which the Greeks inserted an "l," trying to establish the derivation of Τρώλγη, or a cave, to suit the habits and customs of the people; but the name really is native and not of Hellenic origin.

Passing by Adowa, which is an entirely modern town—in fact its origin is probably due to Portuguese influence—and the erection of the Portuguese fortress and convent at Fremona, about half-an-hour from the town, the traveller reaches Axum and its splendid relics of a bygone civilisation.

Space will not permit me here to discuss the ruins at length, suffice it to say, that the monoliths here and the architectural features show that the same people who built Yeha eventually developed their art here under Greco-Roman influence into the highly-decorated objects of Axum. At Yeha we have the plain rude monolith, with an altar at the base; architectural fragments at Yeha also prove that there too they had the storeyed monoliths with windows and fortifications represented in stone. At Axum we start with the original rude monolith—just blocks of unhewn stone stuck in the ground; then we have a monolith with cornered edges and notches up the side; then a further development with bands around the rude stone and representations of beams supporting the storeys. Next, we have the highly-decorated monolith with a sham door cut in the stone, lock and handle all complete, and nine storeys with windows divided by beams and eventually topped by a rounded cap, on the back of which a sun is represented, and on the front a metal plaque had been stuck. Finally we have a monolith on the top of which a Greek tomb is cut, supported by a column with a lotus for its capital, pointing strongly to a late Greco-Egyptian influence.

There is no doubt these monoliths were the product of sun-worship, and that the altars at the base were used for sacrifice; we have one with channels cut in it to let the blood flow down, and Greek kylices cut in the stone, presumably for the reception of the liquid, almost identical with the altars for Mithraic worship found at Ostia in Italy.

All this points strongly to the Arabian origin of the ruins, even if we had not ample testimony to confirm this theory in Himyaritic inscriptions of several periods. At Axum we have the rude stone monument of Arabia, the Bethel, or bætyle, of the Phœnicians in all its several stages, from the uncut stone to the highly-decorated monolith, leading up by numerous storeys to the emblematical home of the great Sun-god.

That Greek influence was at work at Axum down to the Christian epoch we have ample proof from the inscriptions; several of them speak of offerings to Ares in return for victories; others allude to Zeus and Herakles, and some of these are as late as the third century of our era, proving beyond doubt that the Ethiopians were pagans of the Greco-Roman persuasion down to their conversion to Christianity, and that the story of their having belonged to a Judaic form of worship ever since the days of Solomon is one of the many religious myths which have encircled Ethiopia.

I fancy the theory has been principally based on the fact that they have numerous Judaic customs in their ritual to be found in the books of Moses; but then the Jews were a Semitic race, and so were the early Ethiopians, with doubtless many customs and religious observances in common.

A FORGOTTEN VOYAGE OF JOHN DAVIS.

By WILLIAM FOSTER.

STUDENTS of Admiral Markham's standard work on 'The Voyages and Works of John Davis the Navigator'* may remember that, speaking of the period which elapsed between the end of 1589, when Davis returned to Falmouth after serving in the Earl of Cumberland's third voyage, and August, 1591, when he embarked as captain of the *Desire* in Candish's second "attempt for the South Sea," the editor remarks that "whether he remained on shore . . . or whether he kept at sea, is uncertain;" though, for reasons given, he inclines to the latter alternative. The following passages—found quite casually whilst searching for something else—show that the Admiral's inference was correct; that John Davis *was* at sea during part at least of this period, and that, moreover, the voyage in which he was engaged was one of some importance, being, it would seem, the earliest recorded attempt on the part of English merchants to reach India by way of the Cape.†

The extracts in question are taken from a manuscript volume in the British Museum, officially described as Lansdowne MSS., No. 241, a closely written folio of some eight hundred pages, which John Sanderson, Turkey merchant, used as account book, letter book, and general storehouse of information, and in which in two distinct places he jotted down

* Hakluyt Society's Publications, vol. lix. (1880).

† The expedition under Raymond and Lancaster, which is usually reckoned as the first English attempt in this direction, did not start until April 1591. Sanderson does not actually say that the voyage was to be by way of the Cape of Good Hope, and they did not get far enough on their voyage to enable us to lay down their intended route with absolute confidence; but all the evidence points to that conclusion, and there can be little doubt that such was their intention.

notes of the principal events of his life, and more particularly of his travels in the Levant.* From this we learn that Sanderson (who does not appear to have been related, at all events closely, to the William Sanderson who so munificently supported other schemes of John Davis) had not long returned from three years' sojourn in Turkey, Egypt and Syria, when he came into contact with the navigator. Both were men of enterprise; both were keenly interested in those East Indies which were then close preserves of the Portugo-Spanish crown; and the result of their conferences was a bold plan for a voyage which should carry the flag of St. George into the forbidden seas, and win for England a share of that wealth which was the main strength of her hated rival. Sanderson, in the course of his trading in the Levant, must have heard much of the wonderful lands whence came so many of the products that passed through his hands; and he was doubtless well acquainted with the efforts of Newbery and his companions to reach India *viâ* Aleppo and the Persian Gulf.† He was familiar with the difficulties and dangers that attended the overland traffic through Syria and Egypt—perils by the Turks, perils by the Spaniards, perils by the Moorish pirates that infested the Mediterranean—and he saw that, could the ships of Philip on the alternative route be evaded or defied, a direct trade with the Indies might be opened up, and the products of those countries placed at once upon the markets of England and Holland at rates which would bring a fortune to the lucky promoters of the voyage. The account he gives is of the briefest; but it would seem that he and Davis soon found others willing to put a venture into the enterprise; and by the autumn of 1590 all was ready for the start.

How they fared in their bold attempt may best be told in Sanderson's own words. His book contains two accounts of the voyage, both very brief; and, as they are our sole sources of information concerning the expedition, it may be well to give them in full, simply modernising the spelling and punctuation:—

"In September, 1590, we set sail in the *Samaritan* of Dartmouth, bound for the East India, victualled for thirteen months at the least, and well-manned; John Davis captain and pilot, Edward Rieve‡ master. About the Medores [Madeiras] we were overtaken with a great storm, in which extremity we lost our pinnace consort; but afterwards met with an English ship who had saved our men. We had before that storm

* Reproduced, in great part, by his friend Purchas in his 'Pilgrimes' (Book IX.).

† At a later date, Sanderson set his apprentice to copy out from among the papers of the English ambassador at Constantinople the five letters on the subject of this expedition which were printed by Purchas (Book IX., chap. xviii.).

‡ "A little rich Reve, Dier, and others of Dartmouth were owners, victuallers, and voluntaries, were Randall Cotton, Jo. Arundell, Thomas Moore, Edward Rivers, I myself and others, who all came home by cross and loss, for which our God Almighty's mercies His holy name be ever magnified." (Marginal note in Purchas, *vide infra*.)

been in divers fights with Spaniards and braved by a couple of French at unawares. In that voyage, of one hundred and five men and boys we lost only one. A very hot fight we had with an armado of Spain. She gave us seventeen great shot over-night, and in the morning fought some four or five hours; she shot down our topmast, and through our ship and sails above forty times. Yet no hurt to any of us in person except a poor fellow which was touched on the leg with a great stone shot, which shot rested in the ship; the next day an ill surgeon cut off the leg above the knee, in which torment of cutting, sawing, and searing, the poor wretch died in his arms. This jolly Spaniard left us, for if he had durst, he might have laid us aboard. With this fight, and the extreme storm we had before passed, our *Samaritan* was so crazy and leaky, that [we] all in general took our turns at the pump; [we] made four or five hundred strokes in a glass [for many days and nights together] *; with the said water we watered our fish. † So we were forced to return for England, where at Falmouth we arrived in February [1591]; so to Dartmouth. In that voyage we went ashore [only *] at Safia, Santa Crus, and the Medores, as I remember."

The other account is somewhat shorter:—

"Now intended I a voyage unto the East India, [and] victualled out the *Samaritan* of Dartmouth at Dartmouth; Ed. Rive, master, Jo. Davis, captain, J. Sanderson, E. Rivers, R. Cotton,‡ J. Arendall, each victuallers, T. Percie, T. More, R. Mortimore, W. Hart, each voluntary gentlemen who served for their shares—in all one hundred and five men and boys, victualled for thirteen months. But what with an extraordinary and extreme storm and stout fight, we had a forced return, [having] escaped sundry and marvellous dangers. [We] pumped many days together above four hundred strokes in a glass. [We] lost in fight only one poor man, who with a great round stone shot out of a cannon was hit on the leg, the shot resting in the ship; by John Jane § a bad surgeon's handling, he died the next day, and had his body thrown overboard after his leg. After five months, we arrived ship and pepper ‖ safe in Dartmouth,

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* Added in Purchas.

† This suggests that, finding it impossible to effect the object of their voyage, they had set to work to procure a cargo, or part cargo, of fish, for which there was always a market in England.

‡ Afterwards commanded the *Dainty* in Candish's second voyage to the South Sea. He was a great friend of John Davis.

§ This would seem to be Davis's faithful companion and the chronicler of his voyages, though he is always described elsewhere as a merchant or supercargo. Possibly he had undertaken the duty in the absence of a regular surgeon; or again, as the name has evidently been inserted at a later date, Sanderson's memory may have been at fault.

‖ This reference to pepper is difficult to explain; but the word itself is plain enough in the manuscript. It is, of course, possible that they had procured some at one of the three ports at which they touched.

lost and defrauded of all by Captain Davis, *who since was murdered by those of Japan.** [I] borrowed to bear my charge there and bring me home. Ed. Rivers and myself in the snow went in our boats from Dartmouth to Exeter, as I remember. There hired I a horse for twenty shillings, and came with the carrier to London."†

Thus ends the story of this voyage, trifling perhaps in itself, and barren of results as far as its immediate object was concerned, but interesting on account of one at least of the adventurers, and also from the fact already mentioned of its being the first attempt of our countrymen to follow the Portuguese route round the Cape. It is unnecessary to say anything in refutation of the wild charge against Davis made in the last paragraph, as that is sufficiently disproved by his general character for uprightness and integrity; but it may be mentioned that Sanderson was evidently a man of violent temper, and his book abounds with malicious statements concerning the various persons with whom he was brought into contact.

It is proverbially easy to be wise after the event; and, having once found this manuscript account of the voyage, we are in a position to point out that the first of our two extracts already existed in print in the pages of Purchas (Book IX, chap. 16, para. 2), and to wonder that the passage should have escaped the notice of Davis's biographers. But it must be borne in mind that, in the first place, it occurs in a part of the reverend geographer's work where one would least expect to find it, namely, in the general account of John Sanderson's travels which is given in the section devoted to the Holy Land; and secondly, that although a John Davis is mentioned by name, his identity with *the* John Davis could only be conjectural in the absence of the link now supplied by the sentence italicised in the second extract. These few words, however, clench the matter, and seem to leave no reasonable doubt that future biographers of this distinguished seaman will be able to add to the roll of his voyages the attempt "for the East India" in the *Samaritan* of Dartmouth.

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* This crucial passage—which at once identifies Sanderson's Davis with the great navigator—is interlineated, having apparently been inserted in a revision made at a later date (probably about 1615).

† One cannot refrain from adding to this account a side-note made by Sanderson in later years, when, with the thought of death pressing heavily upon his mind, he went through his autobiographical notes, underlining any acts of sin already mentioned, and adding any others that he could recall, this amongst the rest:—"Before my going out on that voyage, walking under a rock near the compass at Dartmouth, I found an iron shot, which I took up. [I] kept it, and carried it aboard the ship *Samaritan*. *I gave fire to a demiculverin.* God of His mercy forgive me that voyage's whole proceeding!"

RECORDS OF THE EAST INDIA COMPANY.*

By STEPHEN WHEELER.

THE first letter-book of the East India Company, never before in type, contains a mass of material bearing directly on a most notable chapter in the annals of commercial geography. The period covered extends from the year 1600, the date of Queen Elizabeth's charter "to certeine Aduenturors for the discoury of the trade for the East Indies"—here printed from the oldest extant manuscript—to 1619, by which time the Company had established factories at Bantam in Sumatra, at Firando in Japan, in Borneo, Siam, and Celebes, at Surat in the Moghul's dominions, and on the coast of Malabar. Among the more curious papers in the volume may be noticed "a discription of the iland of Banda," written early in the seventeenth century. The list of merchandizes "spent and uttered" there includes "Brass peeces of ordinance with chambers in the breeches . . . brought from Chyna as thought"; and doubtless identical with the breech-loading cannon seen by Ferdinand Mendez Pinto on the borderland of China and Tibet. In a "discription of the iland of Amboyna translated out of the Dutch in 1605" will be found a list of English and Hollands goods there on sale, such as "long peeces with smap hances the cocke to stand on the hither side the panne;" that is to say, "snaphances," or guns, with spring locks. The inhabitants of the Celebes are described as heathen, but very good to deal withal, and to live by, "and which doe hold good right and justice and order after their manner."

In a letter addressed to their factors at Bantam, April, 1609, the Company say they have been given to understand that a trade for diamonds may be had to Siquedana in Borneo, "whereof we would be glad to tast." The early history of English enterprise and discovery in the Eastern seas, from Java to Japan, is abundantly illustrated. No less interesting are the frequent allusions to projects for opening up an overland route between Europe and India. Writing in 1607 to their loving friends William Keeling and William Hawkins, the Company exhort them, on their arrival at Aden, to send letters "by some Moores that go to Argier (Algiers) to Richard Allen, Consull theare, or to Aleppo to Mr. Paule Pyndar, Consull." A couple of years later the Company's factors were instructed to endeavour, by all possible means, to send intelligence overland, either by way of the Red Sea to Cairo, whence letters would be forwarded to Marseilles, by the Persian Gulf or by caravan through Persia. There is a letter from one Richard Steel, who in 1616 proposed to reopen the trade between Scind and Ormuz, the native merchants being weary of their long travel overland from Lahore

* 'The First Letter Book of the East India Company.' Edited by Sir George Birdwood, M.D., K.C.I.E., assisted by William Foster, B.A. London, Bernard Quaritch, 1893.

to Isfahan, "which is five months' journey, besides the toyles and customes with loss of many camels." According to Mr. Steel the yearly trade between Lahore and Persia at that time amounted to 12,000 or 14,000 camel loads.

More than one allusion will be found to various projects for discovering the North-west passage. For instance, there is the agreement made in 1602 with George Waymouth, who for the inestimable benefit of his native country and his own perpetual honour, was sent out to discover the passage by the north-west towards the parts or kingdoms of Cataya or China or the back side of America; the said George Waymouth to receive £500 on his arrival at any port within the kingdoms of Cataya, China or Japan. There is also the pass granted in 1606 to John Knight for the discovery of the North-west passage. Knight himself landed on the coast of Labrador, and was never heard of again. The journal of his expedition has been printed by Mr. Clements Markham in one of the volumes of the Hakluyt Society's series. The reader may recollect that Pietro della Valle sailed with an English ship's captain who averred that he had discovered Greenland and showed a narwhal's tooth in proof thereof.

Apart from the literary value of these old records, and the interest that may attach to letters addressed by James I. to that most puissant prince Akbar, or to the great King of Japan, the volume is especially useful for the indication it affords of the spirit which animated the founders of the East India Company, and impelled the adventurers of those days to seek in untravelled regions new outlets for English trade, and new ports where their ships might be laden with the wealth of the East. Nothing could exceed the far-sighted solicitude with which minute instructions were drawn up for the guidance of the captains and factors. It was a great enterprise seriously undertaken, and though these seventeenth-century speculators trusted much to Providence—always to be propitiated by the daily reading of prayers on board their ships and at their factories—as little as might be was left to chance. Dangers were foreseen, and, if possible, averted. Nor was it thought that any English wares, of whatever quality, would find a market and sale in Asia. "We requier you," the Company wrote, "to be more carefull and more diligent to write us, than heretofore you have beene, as alsoe in seeking out what sorts and kinds of all clothes, kersies, and wollen comodities are theare most vendible." The Manchester cottons decorated with figures of ballet girls, which, according to Mr. E. F. Knight are on sale in Chitral, would not have been considered suitable for the Eastern market in the early days of the East India Company.

Of the care which has been bestowed on the printing and editing of these records it would be difficult to speak too highly. Sir George Birdwood's introduction is by itself an exhaustive essay on the history of commercial intercourse between Europe and Asia; while the notes and a carefully-compiled index are useful as well as elaborate.

THE SURVEYS OF INDIA, 1891-92.

During the year ended September 30th last, the operations of this Department were under the superintendence of Colonel H. R. Thuillier, R.E., the Surveyor-General, and his annual report, which has quite recently reached this country, bears testimony, as usual, to a large out-turn of valuable administrative and scientific work. One of the most important events of the year was the appointment of Lieutenant-Colonel Sandeman as Director of Bengal Surveys to superintend the record and preparation of record of rights in Bihar. Of this survey, which has called forth much criticism and enquiry both in India and England, a concise history will be found at page 117 of the 'Memoir on the Indian Surveys, 1875–1890,' published the year before last by the India Office. It is not a new undertaking, as has been erroneously represented in some quarters, but the revival of operations that were instituted under Colonel H. Barron in 1885–86, and which had had their origin in the recommendations made by the Indian Famine Commission in 1880. Other cadastral operations took place during 1892 in Burma, Assam, and the North-West Provinces. With respect to principal triangulations, one party continued to work in Burma along the meridian of 96° 30′, and extended measurements for a direct distance of 195 miles, while a secondary series emanating on the parallel of 21° north latitude was laid out for a distance of 96 miles eastward. Three parties and two detachments were engaged in topographical surveys in the Bombay Presidency, Baluchistan, the Himalayas, and Mergui district, Lower Burma. The area covered by their work amounted to 9909 square miles. Four parties were employed on forest surveys, and one party and one detachment on traverse surveys, while six arcs of longitude were measured by electric telegraph between Waltair, Madras, Bolarum, Jabalpur, Calcutta, Bombay, Fyzabad, and Dehra, thus completing the scheme of differential longitude determination which had been laid down for India proper. There remains some more work of this description to be done in Burma, Baluchistan, and Persia at some future date, but it has been postponed at present in favour of more pressing requirements. Observations with self-registering tide-gauges have been made at fourteen stations in India, Burma, Ceylon, the Andaman Islands, and Minicoy, and tables of prediction based on these are published as usual by the Indian Government.

The area geographically surveyed during the year is considerably less than that obtained during the two previous seasons, no opportunity having occurred for work in Persia. On the other hand, a good deal of new country was mapped out in Burma and Southern Baluchistan. In the former of these two provinces the two parties, Nos. 11 and 21, have brought the quarter-inch scale survey within measurable distance of completion, except in the extreme north, where the country, though very interesting from a geographical point of view, is too unsettled for regular operations. Nevertheless, even here opportunities do occur now and then for acquiring information, and surveyors are attached to the military and police expeditions despatched in various directions. Mr. Kennedy accompanied the column under Major Dalzell to Maingkwan in the Hukong valley, and returned to Mogaung, his starting-place, by the Chindwin route, passing through the Taro valley. The important villages in the Hukong valley are 'Ntup'nsa (26° 41′ N. latitude), the centre of the rubber trade, Ningbyen, where there is, strange to say, a colony of Goorkhas, Saraw, Palawbum, and Lalaung, on the hills above which the larger amber mines are said to be. The chief products of this region are india-rubber, jade, amber, ivory, and opium. During this expedition Mr. Kennedy reconnoitred 3750 square miles.

During January Captain H. M. Jackson visited a portion of the Bret country, which lies south-west of Karenni, in the valley of the Tuchaung, and collected some interesting information regarding the inhabitants. They are much like the Karennis in appearance, customs, religion, and dwellings, but their language is a good deal different, being probably an old dialect that has remained unchanged owing to the isolation of the people in a somewhat inaccessible valley, through which there are only two trade routes, and those difficult and little used.

The despatch of a military column under Sir William Lockhart, K.C.B., against the Isazai tribes in the Indus valley in October, 1892, enabled some surveying work to be accomplished by Captain Wahab, one result of which was to show that the Hasanzai territory south-west of Baio extends further than was supposed.

The operations in Baluchistan, though termed topographical and not geographical, were of considerable importance. They consisted *inter alia* of a detailed reconnaissance for a line of railway communication between Karachi and Kharan, which was carried out by Captain Mackenzie. The Makrán triangulation series was extended westward by Mr. T. E. M. Claudius, and now forms a perfectly connected series based on the great Indus series of the G. T. S. extending through the districts of Bela and Makrán and on to the borders of Persia, following closely the parallel of 26° N. latitude. Mr. Claudius was also in charge of a squad of surveyors, who brought in a total area of 19,084 square miles on the quarter-inch scale of new ground in Kolwan and Makrán, a barren and hilly region, where progress was much hampered by the unsettled state of the tribes. Some useful triangulation was also carried out by Mr. E. A. Wainwright and Rai Bahadur Hira Singh, and topography round Gwatar by Khan Bahadur Yusaf Sharif.

A general inspection of the work of some of these detachments in the field was made by Colonel Holdich, who has also published a most valuable and interesting 'History and Ethnography of Makrán' in the appendix to Colonel Thuillier's report. It is impossible here to give an adequate idea of the amount of research in Colonel Holdich's paper, which is elaborated with all his wonted care, but a few of his more striking conclusions may be noticed. Premising that Makrán possesses an unwritten history earlier than that of Herodotus, who describes Southern Baluchistan and Makrán as included in parts of the fourteenth and seventeenth Persian satrapies, Colonel Holdich says we must go back to 2000 B.C. to find the origin of the remarkable *dambs* or rough stone-built tombs which exist in many parts of the country, and examples of which have been described by Colonel Mockler. From Mr. Bent's researches in the Persian Gulf and his identification of the Bahrain Islands with the early home of the Phœnicians, Colonel Holdich inclines to think the *dambs* of Makrán belong to the same race. Again, Arrian's list of tribes inhabiting the country intermediate between the Indus and Persia can in nearly every case be traced and identified at the present day, showing how little the ethnography of Makrán as it existed in Alexander's time has been affected by subsequent waves of invasion, Arab and Tartar, that have left so deep an impression elsewhere in the history of the East. The products of the country then so highly esteemed—the myrrh and spikenard—are still to be found, and the euphorbia of the sandy wastes and the mangrove of the swamps are still much as Arrian describes them, while with the exception of a few islands such as Pola, Kerabia, and Derenbosa, the broad features of the coast are the same. In any case, the changes are insignificant compared with the enormous geological changes which must have almost reconstituted the climate of high Asia within the same period. Colonel Holdich is also disposed to believe that it is to the Phœnicians that we owe the name Baluchistan, the land of Balus, Baal, or Bal, the sun-god, the Baluchis being curiously enough comparatively recent arrivals in the country.

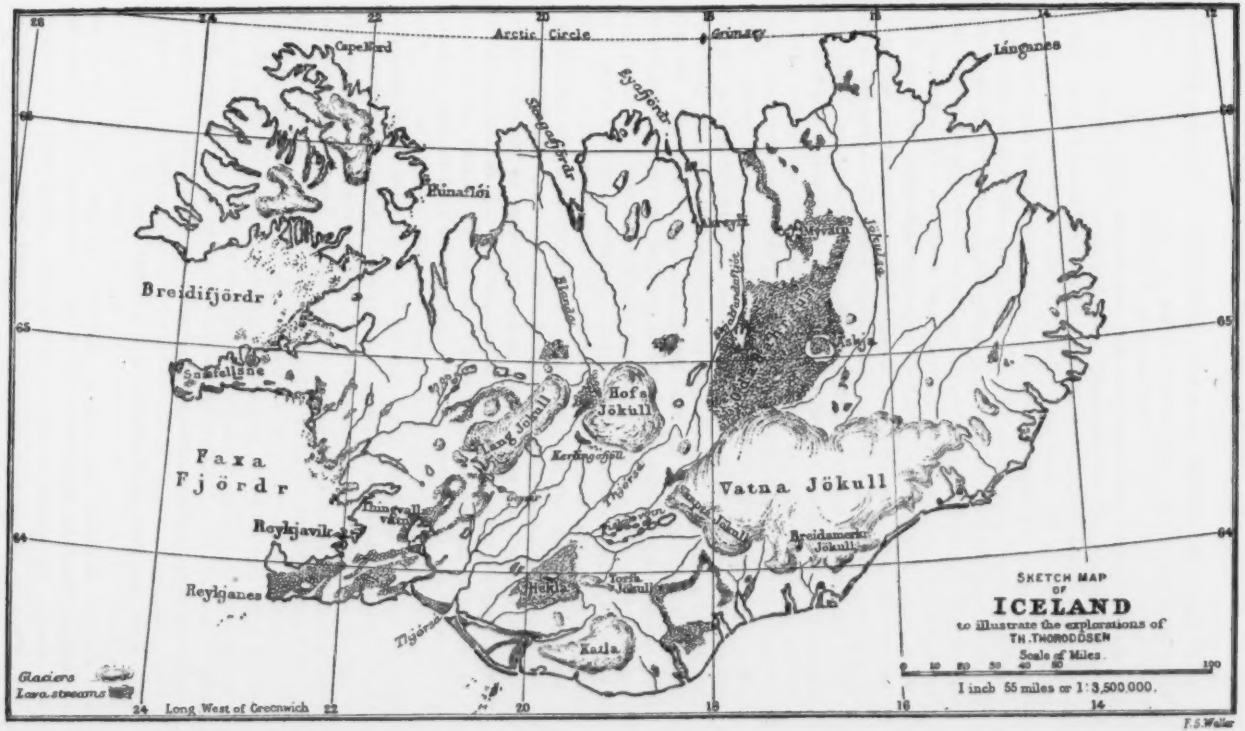
A dark period of history extending over more than a thousand years intervenes between the disappearance of the Greeks and the Arab invasion of Makrán, as told by Ferishta. It seems probable that it was during the misty era of the Arab occupation that European intercourse between India and the East sprung up, and for four or five centuries, while Arabia dominated the East, Venice was mistress of the Mediterranean, and as yet Alexandria was the great emporium of the West. Venetians and Arabs were intimately associated in perhaps the greatest trade confederation of the world. Venetian ducats, so Colonel Holdich says, used to pass current not long ago among the coast people. In the course of excavations at Quetta Sir James Browne discovered some there, and another was found at Tiz by Mr. G. White of the Indo-European Telegraph Department. Colonel Holdich says that the history of Venetian trade supremacy must have existed through those centuries during which Asia and most of Europe were convulsed with the gigantic conquests of Turks and Mongols, and would be of absorbing interest if efficiently recorded. "The chief interest of Makrán history centres however in the busy period of Arab supremacy which extended from early pre-Mahomedan centuries until the Khalifs gave way to the Turks, ere these again were supplanted by the Portuguese. It was when the heavy-prowed, square-sterned Arab dhows and buggalos were busy bringing gold and ivory from the African coast, or carrying spices, spikenard and myrrh from Makrán, or gold brocades, purple and fine linen from India to the great central marts of Egypt, that in all probability Zimbabwe, the gigantic old-world city of Mashonaland, was a flourishing Arab possession. It was then too most likely that the 'ghorbastas,' the great stone 'bunds' of Makrán were built, for these show the same skill in uncemented masonry as the walls of Zimbabwe, and about the contemporary cities of Tiz and Pasni are found the same extraordinary wealth of relics in celadon, china, and Persian pottery as are described by Mr. Bent among the African ruins."

In addition to Colonel Holdich's paper on Makrán, there is a description by Mr. Claudius of the southern portion of the same country, over which his triangulation was extended, and an account by Captain Wahab of the tribes round Aden. His detail survey covered 4420 square miles on the half-inch scale and nearly 7000 square miles of triangulation, the former including practically all the tracts under British influence. The southern part consists of an open plain, extending some 80 miles along the coast on either side of Aden, and varying in width from 6 to 30 miles. The remaining two-thirds of the region surveyed is a mountainous tract rising steadily to the Yaman highlands. The tribes in the neighbourhood of Aden, such as the Abdali and some sections of the Fadthli and Subaihi tribes, are amenable to British influence, but those inhabiting the remoter hills have little or no respect for our power. A survey of the peninsula of Aden on the eight-inch scale will be set on foot as soon as financial considerations permit, and advantage will probaby be then taken to complete the small unsurveyed parts of the surrounding country.

DR. THORODDSEN'S EXPLORATIONS IN ICELAND.*

Travelling in the interior of Iceland is very arduous work, for the country lies high and consists for the most part of sand and lava deserts, often absolutely

* Report of a Paper read at the Meeting of the Geographical Society of Berlin on April 15th, 1893.


Arctic Circle
Cape Kord
Grimsey
Langanes
Breidifjördr
Snæfellsnes
Faxa Fjördr
Reykjavik
Reykjanes
Hofs Jökull
Vatna Jökull
Hekla
Katla
Askja
Glaciers
Lava-streams
SKETCH MAP OF
ICELAND
to illustrate the explorations of
TH. THORODDSEN
Scale of Miles.
I inch 55 miles or 1:3,500,000.
Long. West of Greenwich
F.S. Weller

without grass. The traveller has consequently to take with him even fodder for the horses. The summer, moreover, is short, and the route into the interior occupies much time. For ten summers Dr. Thoroddsen has made excursions through the interior, and during that time has covered about 6000 miles on horseback. There are no roads in Iceland. In the inhabited districts the traveller follows paths formed by the horses' hoofs, and in the uninhabited regions he has to ride where he can and direct his course by the aid of the mountains and the compass, although the latter, in consequence of the ferruginous character of the soil, often undergoes considerable variations. It is very seldom that a journey can be undertaken before July, because in the spring the snow-water soaks the ground and snow still lies on the high plains; indeed in the higher regions pasture-ground for the horses can rarely be found before the end of August. The climate of the interior is harsh and changeable, and snow-storms are experienced in the middle of summer. The sand-storms are often a very great source of annoyance, large tracts being covered with volcanic ashes and shifting sand. For a journey in the interior the traveller has to be well equipped and to have plenty of patience, because he is often obliged to remain many days in his tent on account of bad weather. Good saddles and harness are absolutely necessary, as well as a stock of horse-shoes, as the latter wear out very quickly on the lava-fields. The Iceland horse is a capable, hardy, and intelligent animal, to which one becomes much attached after having ridden it for some time. Among the greatest dangers connected with travelling in the interior are the numerous rapid glacier-streams; their muddy waters render it impossible for the bed of the stream to be seen, and man and beast are very liable to get stuck in the mud; the fording-places change from day to day. Every year men perish in the glacier-rivers of Iceland. Iceland is a plateau region, composed of older and more recent volcanic masses; no formations older than those of the tertiary period have been discovered. The average altitude of the country is from 1650 to 2000 feet; the few lowlands are not extensive, and comprise only one-fourteenth of the entire island. The population is everywhere confined to these lowlands, to the coast strip, and to several small valleys; the whole of the highland is uninhabitable, and only its extreme edges are used as summer pasture-grounds for sheep. Iceland is composed of basalt and palagonite breccia. The latter is found in the centre and more towards the south, but the greater part of the west, east, and north coasts consists of basalt. Rising from the high interior plateau like broad domes are the great glacier mountains. On the south coast at the end of the glaciers which stream down from these mountains there are neither harbours nor fjords, because both the latter have been filled up with the matter brought down by the glaciers. The basaltic regions, on the other hand, are split up by numerous fjords, and there are among them many good harbours. Iceland abounds in lakes. On the highland are large groups of moraine lakes, some of which have been formed by the damming-up of glacier-streams, some lie in the sunken parts of lava-streams, while others are typical crater lakes. In 1889 the traveller visited to the west of the Vatnajökull the magnificent group of crater lakes standing quite alone. The basaltic formation is divided into two strata by peat formation of the miocene period. In the clay strata have been found the remains of a considerable vegetation of the American stamp, which shows that at that time Iceland must have had a temperature like that of Northern Italy to-day. Scattered all over Iceland are patches of liparite, which by their bright colour are easily distinguishable from the dark basalt. The glaciers of Iceland have a total area of 5000 square miles. The raw, cold, humid atmosphere is an important factor in increasing the glacier formation. The Vatnajökull alone measures 3090 square miles. The

height of the snow-line on the southern side is 2000 feet, on the northern side 4300 feet, the air in the interior being much drier. The appearance of the great Iceland glaciers resembles that of all Polar regions; the highest summits of the mountains are covered with flat or slightly vaulted ice-fields, from which proceed comparatively few but very large glaciers. The glacier explosions (jökulhlaup) are peculiar to the country; they occur when there is an eruption of an ice-covered volcano. On such occasions extensive tracts of country are inundated and converted into a roaring sea full of floating masses of ice. Within historical time fjords and small bays have in this way been filled up. During the glacial epoch Iceland was completely covered with an ice-covering of about 3300 feet. In Iceland there are many traces of a shifting of the shore in post-glacial time, especially in the north-west of the island. Here the shore-lines are grouped in two levels, the higher being from 230 to 260 feet and the lower from 100 to 130 feet above the sea.

Very large expanses of country (4500 square miles) in the middle of the island are covered with recent lava deposits; these districts, frequently without vegetation of any kind, present a miserable appearance. The largest connected lava-desert is the Odádahraun, in the north of the Vatnajökull, which covers an area of over 1500 square miles and lies from 2000 to 4000 feet above the sea-level. Its cubical contents are calculated to be at least 283,000 cubic yards. This great lava-field has been formed by the eruptions of about twenty volcanoes. The form of the Iceland volcanoes is not the typical Vesuvius form, but it consists of a number of dome-shaped lava mountains, with a small inclination of 1° to 8°, as in the Sandwich Islands. The most frequent form of manifestation of volcanic eruption is the formation along a space in the ground of a series of low craters which is often some miles in length. Since the colonisation of Iceland in the ninth century more than twenty volcanoes have been active; Hekla has had the largest number of eruptions, viz., twenty-one, and Katla twelve. The greatest eruption in historical time was that of Skaptá in 1783, in consequence of which half of the horned cattle in the island died, eighty per cent. of the sheep, seventy-seven per cent. of the horses, and nine thousand three hundred human beings, or about one-fifth of the entire population, perished in the following two years from famine and sickness. The volcanoes are not, as was formerly supposed, limited to the region of the palagonite breccia. On the Bay of Faxafjördur are many small volcanoes which have broken through the basalt. Hot springs by the hundreds are scattered throughout the whole island. Springs containing carbonic acid are found mainly in the Snæfellsne peninsula, and solfataras in the middle districts, where there are still active volcanoes. In the neighbourhood of the solfataras one always finds a number of boiling clay basins. The most magnificent solfataras were discovered by Dr. Thoroddsen in 1888 in the Kerlingarfjöll near Hobejökull.

The colonisation of Iceland from Norway commenced in the year 874, and by the year 930 about the same area was inhabited as is now the case. The aristocratic republic lasted until 1262, in which year the personal union with Norway took place. Together with Norway, Iceland fell into the hands of Denmark in 1389. In ancient times the Icelanders carried on an independent commerce. In the fifteenth century the trade became English, in the sixteenth Dutch, and in 1602 the Danish system of monopolies was introduced, which ruined the country from an economical point of view. In 1854 trade was made free, and in 1874 the Icelanders obtained a free constitution of their own. In more recent years the country has evidently made great advances. Although the common people live under oppressive economical conditions, in no country in Europe are so many books printed and sold as in Iceland, having regard to the number of its inhabitants. With a population

of seventy thousand, there are in Iceland five printing-houses, the first of which was established as far back as 1530. These printing-houses publish ten newspapers and eight periodicals. Of the seventy thousand inhabitants, sixty thousand live by cattle-breeding, especially sheep-breeding. The number of sheep is estimated at one million, and of horned cattle at twenty thousand. The cultivation of barley, which in former times was never found to be profitable, has now been abandoned altogether. On the other hand, horticulture has made rapid strides; potatoes cabbages, and rhubarb flourish very well. Iceland has had no proper forests during the post-glacial epoch, but the birch thickets were once more widely extended than they are to-day, the sheep-rearing industry having destroyed the old bush-woods. *Betula intermedia* seldom attains to more than a man's height. Only in one spot in the eastern district did Dr. Thoroddsen find specimens 30 feet high, as well as some mountain ashes (*Sorbus ancuparia*).

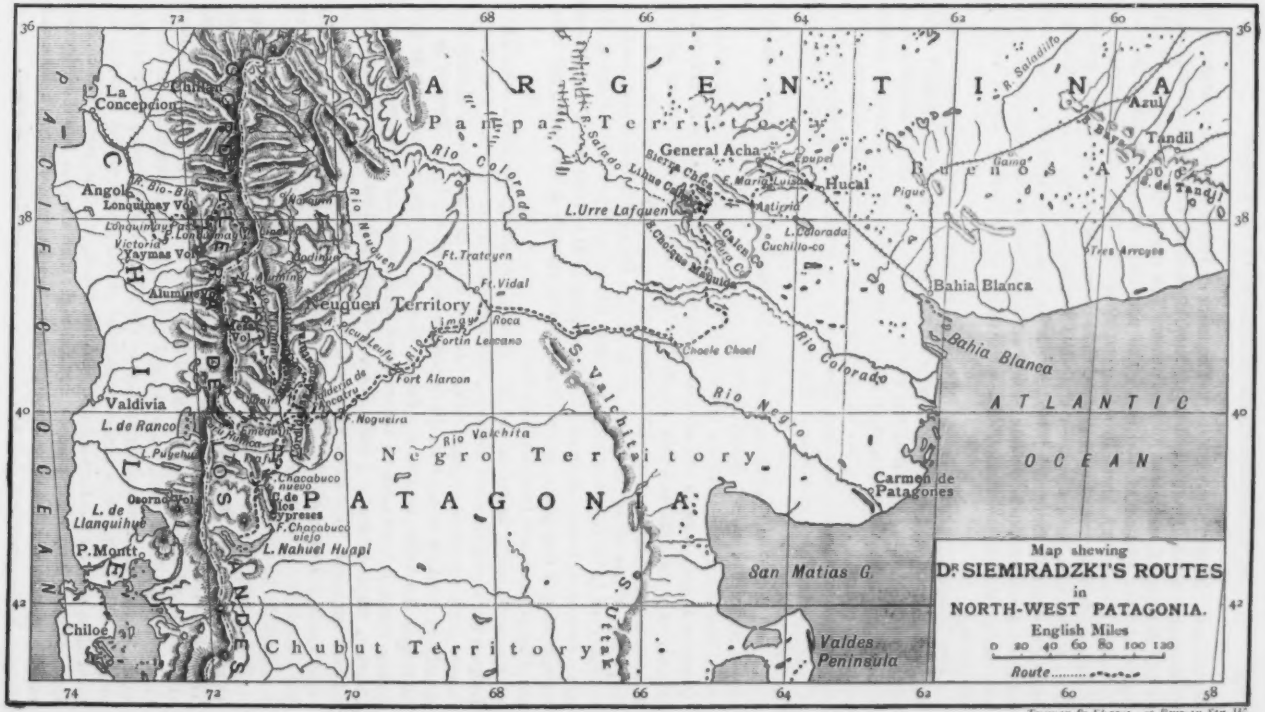
DR. SIEMIRADZKI'S EXPLORATIONS IN PATAGONIA.

Dr. Josef Siemiradzki's paper on Patagonia (*Petermann's Mitteilungen*, 1893, iii.) contains a great deal of valuable information about a country the exploration of which has been greatly neglected. The official documents lately published are, in Dr. Siemiradzki's opinion, utterly unreliable, having been either compiled from untrustworthy sources, or falsified for speculative purposes. The geological part of the 'Informe Oficial,' published by Professor Doering (in 1882), contains reliable information about the geology of the Argentine Republic; but it only gives scanty information about the Indian territory. Ducloud's map of the Pampa Central (1887) is evidently insufficient for regions which have not yet been visited by Europeans. As to Rhode's maps of Neuquen and of the Pampa Central (1886 and 1889), they are, Dr. Siemiradzki shows, absolutely fantastic in some parts.

The author went, in November 1891, from Bahia Blanca to General Acha, thence south and west to Choele-Choel, and thence westwards, exploring the whole basin of the Limay River up to Lake Nahuel Huapi. By the end of April 1892, he crossed the Pass Lonquimay and entered Victoria, returning to Buenos Ayres *viâ* Mendoza. A short trip to Uruguay completed the journey.

Two different regions, as already remarked by Darwin, must be understood under the name of Pampa; the lower region, from 130 to 260 feet (40 to 80 metres) above the sea, which does not extend southwards further than the Tandil Hills, and the higher Pampa, 650 to 980 feet (200 to 300 metres) high, which gradually rises in the west of the Salado River to the altitude of 3280 feet. A gently sloping terrace, which stretches in a north-western direction from Mar del Plata towards Villa Mercedes, separates the two regions. The lower Pampa is covered with loess, which the author supposes to be an alluvial deposit of the Parána River transformed by prevailing winds into steppe loess. It is thus similar to the loess of the South Russian Steppes (which, by-the-way, is not of a properly fluviatile origin), but differs from it by the want of the well-known humus covering. The loess covers pliocene shell-bearing sands of marine origin, which attain an altitude of 130 feet in the La Plata region, and of 250 feet at Bahia Blanca. Further north the loess attains a great thickness, and the underlying formation is not seen in the river-banks.

The little unfinished railway, which leads from Bahia Blanca to Hucal, crosses the spurs of the Tandil Hills (Sierra Baya and Sierra Chica), which rise by about 500 to 600 feet over the Pampa. Hucal (430 feet) lies in one of the numerous little valleys which intersect the steppe, and have a much richer vegetation than the



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steppe itself. These valleys are marked on maps as Indian routes, and originate in the numerous parallel granitic and porphyritic ridges which intersect the Pampa in a general direction of north-west to south-east. The lowest point observed in this region had the altitude of 800 feet. The climate is extreme, a night frost on December 10th being followed by a temperature of 120° Fahr. The vegetation and fauna are characteristic of steppe-lands. The hills of Lihue-Calel form a series of spurs of the Cordillera, and form a marked dividing-line with regard to climate, geological structure, fauna and flora, between the high grass-steppe in the north and east, and the Patagonian plateau which stretches, with monotonous uniformity, westwards towards the Andes, and southwards to the woody region of Rio Gallegos.

The Patagonian plateau is covered with old crystalline ridges running north-west to south-east, and generally described under the name of "Mahuidas." The whole is covered with small boulders, which are more angular in the neighbourhood of the ridges, and make a sheet about 35 feet thick, cemented by calcareous matter in its lower parts. The structure of the plateau is made plain by sections in the deep ravines of the Colorado and Rio Negro. A fine-grained, shaly sandstone, belonging to the lower oligocene, is there seen to fill the spaces between the low crystalline ridges.

Beyond the Lihue-Calel ridge, the thorny bushes characteristic of Patagonia soon appear, and also representatives of its fauna.

Another ridge, the southern spurs of which are known as Choique-mahuida (Ostriches ridges), runs in the same south-eastern direction; it is wild and uninhabited, only its granite dome, about 1650 feet high, is well known to the surrounding population. The hills consist of red porphyritic granite, and run in parallel ridges along the right bank of the Cura-có, between the southern extremity of Lake Urre-Lafquen and River Colorado. The highest ridge is the south-western, and may attain an altitude of from 1300 to 1600 feet above the sea. Its vegetation is very poor; no river flows from it, the only water being a salt lake, about 27 miles distant from the Colorado.

The wide, sandy valley of the Rio Saiado, containing the bitter lake Urre-Lafquen (at least 700 feet of altitude), lies between the two ridges. A number of smaller lakes surround the chief lake, and all wells in the desert (Salitral) also containing brackish water which, however, is used for drinking. Further to the south-east the valley of the Rio Saiado (Indian Cura-có) is deeply cut in into granite rocks, but contains no water except from rain. As to the valley of the Colorado, which is nearly 7 miles wide, it is sunk for nearly 250 feet into the miocene sandstone. The river, when full, is from 330 to 440 yards wide, and is rapid, although Indians and the horses can swim across it; in the winter it contains but little water. The valley has but a poor vegetation, but is well inhabited on account of its being the highroad to Chili for traders in cattle.

The country between the Rio Colorado and the Rio Negro has the same character as above, and is also intersected by low ridges running north-west to south-east. The valley of the Rio Negro is wider and deeper than the preceding, the altitude at Choele-Choel being not more than 330 feet, while the steep cliffs on the left bank rise about 450 feet—a broad, waterless, and flat tract of land extending, on the left bank, between the river and the footings of the hills. Water is everywhere in great demand, and the irrigation canals constructed at the mouth of the Neuquen are insufficient even for the Roca colony. Colonel Belisle, who has planted an orchard is compelled to have water pumped day and night from a laguna into the irrigation canals. A steamer keeps up communication on the Rio Negro between Roca and Carmen de Patagones from July to February, the months of sufficient water.

The Limay River at its junction with the Neuquen is from 220 to 330 yards wide, and the amount of water contributed by the two rivers for the formation of the Rio Negro is nearly equal. Its current is swift, but powerful steamers navigate it as far as Lake Nahuel Huapi. Most of its tributaries are also navigable. It remains navigable all the year through.

The mountains Sierra Roca marked on Argentine maps do not exist, the space between the Neuquen and the Limay being simply occupied by the high plain, which already attains an altitude of 1400 feet. Its steep walls facing the rivers were taken for mountains. Patches of excellent meadow-land are found in the Limay Valley on its left bank, while on its right the river flows close to the walls of the high plain. The red sandstone cliffs of the Patagonian plateau rise higher and higher as one advances south-westwards up the Limay, and attain altitudes of from 2650 to 3000 feet at the Cordillera of Catalin. The sandstone becomes also dislocated in this locality by andesite lavas, large sheets of a porous lava also covering the sandstone and thus raising the level of the plain to 3300 feet above the sea.

At Noueira Dr. Siemiradzki left the Limay to cross in a western direction the Cordillera de los Angosturas, which consists chiefly of granite intersected by lavas and covered with oligocene sandstones. The ridge runs in a meridional direction, attaining 5000 feet above the sea. Traces of glaciation are evident, the whole being covered with glacial drift. Plenty of water and rich meadows make the Cordillera pleasant to look at, even in the absence of trees. It is inhabited by Pehuenches Indians, driven from Tandil. Volcanic tuff and sheets of lava cover the 2650 feet high plateau which leads to the valley of Collon Cura (2000 feet).

The ground between the Collon Cura and the second Cordillera rises westwards in terraces formed by glacial deposits (ground moraines). As to the river itself, it is 250 to 330 yards wide, rapid but navigable, and receives several tributaries from the right.

The passes across the Andes at the head of the Chemen-huin are low (2300 and 2430 feet), and a low hill only separates the Quilquihue, tributary of the Chemen-huin, from the Huechu-echuen, a streamlet flowing into Lake Picau-llu (Lacar), whose waters are emptied into the Pacific Ocean. The highest spot of the Andes in this latitude is the Chapel-có (8000 feet), but altogether the second Cordillera (de los Cypresses) is but a narrow andesite wall, rising 6600 feet above the sea.

The Lake Nahuel-Huapi is much smaller than it is shown to be on Rhode's map. It consists of three branches, and granite mountains, snow-covered and more than 6500 feet high, rise on its southern shore. The climate at this lake is very wet, and the rich vegetation bears testimony to the abundance of water. Altogether, the flora and fauna entirely change their characters at the foot of the Cordillera.

The best passes to Chili are in the north of the lake, while to the south of it there is no passage, even for foot-passengers. The best way to Chili is the Lonquinmay Pass (38° 30′ N.), but even this pass in only good for riding on horse-back, or for the two-wheeled "catangas" of the Chili cattle-traders. In winter all passes are rendered impracticable by snow.

The greatest inaccuracies of Rhode's map appear in the region in the upper course of the Collon-Cura River; but we cannot follow Dr. Siemiradzki in the enumeration of these errors, which will be best seen on comparing both maps. The Collon-Cura is made by the confluence of the Rio Alumine and Rio Catalin, which are separated from each other by the gneiss-granite mountains of the Cordillera di Catalin (about 6600 feet high), a high grass-steppe, nearly 3300 feet high, stretching in the west of the meridionally-running ridge. The Alumine River flows

in a very narrow valley dug out in the plateau; but in the west of it the country is not flat, a whole series of extinct volcanoes, at least 5000 feet high, rising over the plateau, and making a chain of volcanoes independent from the Chilian main ridge.

The last inhabited spot on the Argentine territory is the estancia of an American farmer on the Pulunneri streamlet. Snow attains here in winter a depth of 3 feet, while in the Alumine Valley, only 300 feet lower, cattle can graze all the winter through.

The laguna Alumine (3000 feet) is very picturesquely situated amidst a plateau which but slightly supersedes this altitude, and has in the south of it an extinct volcano, whose lapilli are spread for miles round in thick layers; the river of the same name takes, however, its origin—not in the lake, but a little further north, in a continuation of the upper valley of the Bio-Bio, where the waters flowing to the Pacific and those flowing towards the Atlantic take a common origin. From this spot a steep slope leads to the fertile and wide valley of the Upper Bio-Bio, which does not take its origin in the laguna Hualletue. The vegetation is, however, rather poor, and it is only in the west of the frontier post Longuimay that one enters in the Chilian Cordillera, the uninterrupted Araucanian virgin forests, which stretch as far as Victoria, but are rapidly cleared by German and Chilian colonists. At Collipulli the last traces of these forests disappear, and one enters the regions of cornfields and vineyards.

The coast-region Cordillera is insufficiently known. It consists of grey granite and seems to be a remainder only of the largely-extended palæozoic formations of the South American continent.

The final conclusions of the Author are very interesting. He sees in South America two chief systems of mountains. The old palæozoic system runs north-west to south-east, and it forms, besides the oldest part of the Coast Cordillera, the spurs of the Andes in the Argentine Pampa, in Bolivia, Paraguay, and Brazil. A younger system of upheavals, which prevailed since the Trias epoch till now, has a meridional direction. Three different eruption periods may be distinguished in this system: (i.) the eruptions of metaphyres and stratified porphyries (jurassic and cretaceous); (ii.) the basalts of the cretaceous period; and (iii.) the andesites of the Tertiary and Quaternary period; this latter is only limited to the Andes—two great crevices running along them—one on the west slope of the great Cordillera, and the other in the east of it.

The similarity of these great features of the region explored by Dr. Siemiradzki, as compared with the structure of the great plateau of East Asia in Siberia, is most striking, if we only remark that the north-west to south-east direction of the palæozoic upheavals in America is represented by south-west to north-east upheaval in Asia. As to the Tertiary and Quaternary andesite eruptions on both sides of the border ridge of the plateau, the similarity is singularly striking. (P. K.)

GEOGRAPHY AT THE FORTY-SECOND GERMAN EDUCATIONAL CONGRESS.

This congress was held on the 24th, 25th, and 26th of May in Vienna; and thanks to the exertions of Prof. Dr. Penck, geography was represented for the first time. Altogether there were eleven papers given in the Historico-geographical section, of which seven were of geographical import. The president of the section, which

embraced ninety-eight members, was Prof. Dr. Oberhummer (Munich). The Vice-President was Prof. Dr. Oppel (Bremen).

The president opened the discussion by an address on "The present state of our knowledge of the ancient world." He gave a clear and exhaustive review of the German and other literatures in which investigations upon the subject were recorded, and he summed up by dwelling upon the necessity of rejecting the historico-philological aspect of ancient geography, and of adopting, in its stead, the historico-geographical method.

A paper followed, "On the history of the so-called dwarf people of Africa," by the well-known traveller, Dr. Lenz (Prague).

The next paper was read by Dr. A. Oppel (Bremen), on "The scholastic progress of geography." He showed a large wall map constructed by himself, in which the progress of geographical discovery from mediæval times up to date was pictured in graduated form, according to centuries. The history of the discoveries of the Earth's surface is, according to Dr. A. Oppel, a most useful, instructive, and stimulating addition to geographical or historical teaching, and absorbs but little time. Until the present date, however, there has been wanting an efficient means of representation which would show this progress both clearly and impressively. The lecturer then proceeded to explain his map, which was meant to supply this generally felt want. Land discoveries of the last five centuries were distinguished by a special body colour, while the maritime discoveries were indicated by lines. During the debate which followed, the map was acknowledged as being a most graphic one, and the utility of this branch of knowledge was unanimously recognised.

Prof. Dr. Fr. Umlauft spoke next "On the progress of map drawing in schools," and on the methods of drawing maps. He arrived at the following conclusions: Map-making should not receive too great an attention in schools, because the time available is usually insufficient for repeated drawings; it is preferable to study well-printed maps. For the same reason the tracing of maps is not to be rejected. Outline maps are but poor substitutes, but still, if well used, they furnish the memory with good bearing-points. Care should be taken to avoid the use of "normal lines," or any artificial helps for construction, as they only overburden the memory. The best plan is to draw maps merely with the help of the projection; and even then, for small areas, to use only the central meridian and the central parallel. In no case should oral instruction and verbal indications be abbreviated in favour of map-drawing itself, for only by the way the former are handled and understood can we recognise both the efficient teacher and the apt pupil.

The last lecture of the first day of session was given by Dr. Grissinger (Vienna), On the vertical distribution of the population of Austria-Hungary. The towns and villages of the monarchy are situated at heights above the sea-level, ranging from 6232 feet down, and it is interesting to note that the most elevated towns are in no case found near the highest summits, doubtlessly in consequence of the greater steepness of the ground. Referring merely to the larger places, 3000 of which contain 36 per cent. of the total population, we see that they are only found up to an average height of 3608 feet above the sea-level. The distribution of places, as compared with the population, was shown on a graphic table, on which different heights were represented by contours of 100 meters (328 feet) apart. The relatively largest towns are found, in the Austrian territory, between the heights of 656 feet and 944 feet, and in the Hungarian country between 328 feet and 656 feet. Only the Alpine lands deviate from the general rule that the maximum population is found at the height where the greatest number of inhabited places occur; a fact amply illustrated by the large population of Vienna itself.

Dr. K. Peucker lectured next on: The Construction of a School Atlas; the following is a short summary of the paper:

The projection ought as far as possible represent the natural globular curves of the area covered by the map in order to constantly remind the pupil of this most fundamental of all geographical facts. The lines of the projection should serve to represent this bodily form just as the contours and hachures serve to represent the bodily form of mountains. In drawing positions, the latest reliable maps ought always to be consulted, and in generalising forms the following rule ought to be observed: characteristic individual forms are only to be represented in reduction as long as they can be easily distinguished—the lines ought never to appear as if drawn with a trembling hand. Dr. Peucker proposed to establish a third independent factor for representation in addition to land and sea—namely: glaciers and ice (white). The pupil can then understand at a glance why the poles are not yet discovered, and why the so-called north-west passage does not really exist. The representation of the ground is also materially helped by this additional graphic form. If it is wished to represent not only a relative, but an absolute height it is desirable to use graduated shadings of body-colour for the various elevations, only thus can the exact analogy between the sea-level and geographical latitude find its adequate cartographical expression. Finally the lettering should not be considered as a *necessary evil* of the map, but rather as an intrinsic part of the same. A map is essentially a rudiment and requires description; without the latter it is as worthless as would be a plan of a town upon which the streets had not been named. More pains ought to be taken than have been taken hitherto, to improve the beauty of the characters and also greater care should be given to the proper distribution of the names.

The last paper during the conference was given by Professor Dr. Penck, and entitled: "The state of Geographical Instruction in the Secondary Schools of Austria, Germany and France."

How little care had been given to geography in the gymnasia of Austria and Germany was evident from the fact that in *none* of the forty-one educational congresses held up to the present, had there been a geographical section. Indeed, up to the present day, the study of geography is only officially recognised in the lower gymnasia of Austria, while in Prussia geographical instruction has even retrograded. France forms a great contrast to the other two countries, for since 1870, geography is a branch which is taught with enthusiasm, and receives ever-increasing care. It is quite astonishing to see what a real store of geographical knowledge is imparted to the children. This is as it should be, for geography belongs to general culture, and surely general culture is the aim of our secondary schools! The lecturer proposed a resolution referring to Austrian and Imperial German secondary schools, which was finally seconded after a lively debate, and adopted in these terms: "The Geographical Section of the forty-second German Educational Congress is of opinion that Geographical Instruction, considered as an independent branch, is of absolute necessity in *all classes* of the gymnasia and similar institutions."

THE MONTHLY RECORD.

EUROPE.

Survey of the English Lakes.—During the latter part of June and the early part of July, Dr. H. R. Mill has been engaged in making a systematic bathymetrical survey of the larger lakes of Cumberland and Lancashire. He was assisted in this work by Mr. E. Heawood, and by Mrs. H. R. Mill, and for part of the time by Mr. A. J. Herbertson, the cost being defrayed by a grant from the Council. The soundings made were designed not for the purpose of a navigational survey, but in order to delineate the general configuration of the various lake basins. Soundings were accordingly made at close intervals along a series of lines crossing the lake at right angles to its axis, and never more than half a mile apart. The ends of each section were fixed by reference to landmarks shown on the 6-inch Ordnance Survey maps whenever this was possible. In the case of a change in the coastline since the survey was made, or in a featureless stretch of coast, the exact positions were determined by sextant angles. The transverse sections were connected by oblique sections, along which the soundings were more widely spaced, and in addition longitudinal sections were made whenever it was practicable to do so. The work of each day was plotted in the evening, and contour-lines of depth drawn from the figures obtained. Any peculiarity in the run of the contour-lines was confirmed by additional observations on the following day, and in many cases very close soundings were required. On Derwentwater over eight hundred soundings were required to define the contour-lines of each 25 feet of depth, but in the other lakes a smaller number was usually found sufficient. In Derwentwater the greatest depth found was 72 feet, but the surface of the lake was much below its usual level, being lower, probably, than has ever previously been recorded. Bassenthwaite Lake, though simpler in configuration, was found to have about the same maximum depth. Ullswater, the largest lake in England except Windermere, was found to have a maximum depth of 208 feet, but it is quite possible that deeper soundings might be obtained. This lake was remarkably interesting on account of its division into a series of deep basins separated from each other by wide bars, from the most pronounced of which a rocky islet rises showing the characteristic marks of ice-erosion very clearly. Coniston Lake is simpler, being one practically straight deep trough, the deepest part of which is at least 184 feet below the surface. Wastwater, the last of the lakes to be sounded, was similar in configuration though of much greater depth, an area 1 mile long and ¼ mile wide, being deeper than 250 feet. The flatness of the floor of this depression may be judged by the fact that 258 feet was the greatest depth found in it. Samples of the deposit from different parts of each lake were secured

and will be examined by a specialist. Temperature observations were also made and a number of interesting facts connected with the penetration of solar heat in the deep water discovered. It is probable that a similar survey of Windermere will be undertaken in the beginning of September, and possibly some of the remaining smaller lakes may also be sounded. Although this work makes it possible to delineate on maps many square miles of England hitherto quite unexplored, its main interest will lie in the comparison of the configuration of the English lakes with those of Scotland and other countries. The complete discussion of the soundings will necessarily occupy a considerable time.

Mr. C. T. Dent's Winter Photographs of the Alps.—There is at present on exhibition in the map room, a series of photographs of Alpine scenery taken by Mr. Clinton T. Dent in mid-winter. They are not only remarkably fine specimens of photography, but possess considerable value from a geographical point of view from the manner in which they show the action of the weather on the rocks, and the snow and ice forms; the view of the seracs on the Rosenlaui glacier is a striking example of the latter. The perfection of some of these photographs is well shown by the manner in which they have stood the test of considerable enlargement. Among the most striking photographs in this interesting collection, are the following; the Eiger and Mönch from Mürren; Gletscherhorn, Breithorn and Ebnefluh, from Mürren; Rosenlaui Glacier; the Wetterhorn from below Grindelwald; Monte Rosa, Gornergrat and Hohthäligrat from the Schwarz See; a very fine enlargement of a photograph of the Matterhorn from the Riffel Alp; a spur of the Täschhorn, and avalanche tracks, Furggen glacier. Though special mention has been made of these views, the whole series is in all respects one of the finest exhibitions of amateur photography that has ever been on view in the Society's map room.

North German Tertiary and Diluvial Deposits.—The possibility of the tertiary deposits of North Germany having been derived from an old formation of laterite in Scandinavia is discussed (*Ausland* 1893, Nos. 11 and 12) by H. J. Hass, of Kiel. Having shown that in the ancient Scandinavian continent rocks of the required nature (granite, sandstones, etc.) were present, while the warm and moist climate (especially the absence of frosts), indicated by what we know of the flora of tertiary times, was also favourable to the formation of laterite, he points out that the North German deposits are exactly of a character to have been formed by the large streams which in those days would wash down this material to the sea. The red colour characteristic of laterite, due to the oxidisation of iron, is not generally seen in North Germany; still, in certain shore formations of Denmark, in which the heavier constituents would be most likely to be found, important ironstone formations do occur. The diluvium, too, it is held, was more probably loose material transported from Scandinavia than the result of the erosive power of the ice; and the quantity of iron in the well-water of many of its towns may be derived from laterite brought along with materials of different character.

Phosphorescence in the Odessa Limans.—The *limans* in the neighbourhood of Odessa, that is, the salt-water lakes on the shore, which have already lost their connection with the sea, are sometimes seen to emit a phosphorescent light, and the fact was especially striking in 1890–1891. As the *Noctiluca miliaris*, which renders the water of the Black Sea phosphorescent, does not inhabit the *limans*, their water was carefully investigated by M. Zabolotuyi (*Memoirs of the*

Novorossian Society of Naturalists, vol. xvii. No. 2, 1892), who found that all the light is due to an infusorium, *Glenodinium* (allied to *G. cinctum*), from the *Peridinidae*. It appears that it is the protoplasm of the little animal which emits the light.

Hungarian Place-Names derived from Fishing Industry.—The Hungarian Geographical Society's *Bulletin* contains a short paper by Otto Herman, in which the author points out the difficulty of accounting for the large number of Hungarian place-names derived from terms connected with the fishing industries on the theory usually advanced by historians—that Hungary was at one time covered with innumerable *piscina* or fish-ponds. A more probable explanation is suggested by the division of the fishing-grounds of the Balaton Lake, particularly near the Tihany Peninsula, where the fisher-people, cut off from the main streams of civilisation, retain many ancient customs and regulations unaltered. The inshore waters surrounding the peninsula are divided into thirty-six hexagonal fields some 400 yards to 800 yards long and 250 yards wide, each having a distinctive name; and every fisherman knows exactly the position and limits of each area, the nature of the bottom, and state of the fishing in each at any particular time. In this way it appears that thirty-six place-names can be accounted for at once, for each fishing-ground gives its name to the part of the shore opposite to it. It would be interesting for the author to compare the development of names in the historic case of Tihany with the modern example of Long Island Sound; the areas allotted for oyster-fishing by the New Haven Commissioners receiving names from the fishermen renting them, which will probably be represented sooner or later by place-names in New England. One purpose served by the Tihany names, that of enabling watchers on the heights to describe the positions of shoals of shield-fish to those in the boats, corresponds curiously to the similar method of marking pilchard shoals, common in Cornwall.

ASIA.

Visit to Ulu Kinta and Ascent of Gunong Kerban, Perak.—A recent number of the *Perak Government Gazette* contains some notes by Mr. G. A. Lefroy, the chief surveyor of the State of Perak, on his visit during 1892 to Ulu Kinta and ascent of Gunong Kerban. Gunong Kerban, which is 7127 feet in height, is probably the highest point in Perak territory. Soon after leaving Ipoh the expedition struck eastward, and followed up the bed of the Sungei Choh to the Sungei Suntu; thence in a north-north-east direction until the Kinta River was reached. The main river was followed up to the Kuala Chermin, from which the ascent of Kerban is made. The bed of the Kinta River is here about 1029 feet above sea-level. The ascent was made by Batu Shallek, a spot about 3395 feet above sea-level, and Gunong River, about 5600 feet in height. The valley of the Kinta has a great tendency to erode away on its right bank, hence the slopes on the Kerban, or north side, are extremely precipitous; while those on the south are long and gentle in comparison. Much of the Kinta district appears suitable for planting purposes. Kerban, to a height of about 5000 feet, is composed of grey granite rocks and boulders with a shallow soil. Above 5000 feet the granite is overlaid by a schistose formation, which is being rapidly removed by denudation; and the evidences of numerous landslips in the neighbourhood would point to the fact that the crest of Kerban has been much higher in past ages than it is now, and the crest is the remains of a secondary formation which has now disappeared except on the tops of the higher mountains and some isolated hills in the low country in Larut. This formation is

traversed by several quartz veins. The change in the geological formation at 5000 feet is plainly marked by the characteristics of the flora, which at this elevation becomes very stunted.

Siam.—M. Fournereau's report of his archæological researches in the kingdom of Siam is published in a recent number of the *Bulletin* of the Geographical Society of Paris. He arrived at Bangkok in April 1891, and after studying there some Siamese peculiarities of architecture, left in the dry season for the North. After a journey of eighteen hours on the River Menam he reached Kamfeng Fet, near Sajanalaya, which was once the holy town of the Brahmins of the North, but it has now almost wholly disappeared. M. Fournereau then went by land to Sukhodaya through forests of teak and by many old quarries of ironstone. This was the capital of the Thais, and the temples must have been of great importance. M. Fournereau found there slabs of sandstone with engraved figures and inscriptions. It is three days' journey from Sukhodaya to Sangkalok, the latter having been once a great commercial centre famed for its pottery, and M. Fournereau counted about forty old kilns. There they made porcelain like that made in Korea, but the attack of the northern barbarians put a sudden stop to this industry. From Sangkalok he travelled two days by elephant to Thung Jang, whence he went to Uttharadit, the last Siamese capital of the North, and took a glance at Muang Labli, the first large Laotian village. Among other cities he visited was Lophaburi, founded in A.D. 600, and there the kings resided during the floods.

Exploration in Northern Syria.—In the last number of the *Quarterly Statement* of the Palestine Exploration Fund, the Rev. Dr. G. E. Post publishes the diary of a journey in which he accompanied Professor West, who was charged with extending the accurate map of Palestine to the Lebanon and Anti-Lebanon ranges. With the exception of the south-eastern flanks of Hermon, which are volcanic, the Lebanon and Anti-Lebanon are both of limestone formation. The effects of erosion by water are much more distinct on the Lebanon chain on account of the greater rainfall; and the sublime gorges which furrow its western slope bear no comparison with the tame wadies of the Anti-Lebanon. Lebanon is a single ridge with a series of commanding peaks rising from it, while the Anti-Lebanon is of complicated structure. It is formed by the great ridge of Hermon in the south, from which five ridges diverge northward like the rays of a fan. The space included between these ridges is a plateau ranging from 4000 to 5500 feet above the sea, the ridges rising to an elevation of 7000 to 8400. The conical summit of Halaim, which has a more distinctive flora than the rest of the system, rises at the northern end of the second of the five ridges, counting from the west. Dr. Post made an extensive botanical collection in the course of his journey.

The Position of Mount Sinai.—In the *Asiatic Quarterly Review* for July, Professor A. H. Sayce gives his reason for believing the term Sinaitic Peninsula to be a misnomer. He traces the origin of the belief that Mount Sinai was situated in the peninsula to the Christian anchorites of the second century, and the belief, although more than once questioned, has grown stronger down to the present day. Professor Sayce shows from the Old Testament records and the Egyptian monuments that certainly Mount Sinai was not in the peninsula now called Sinaitic. The "Yam Suf" of the book of Exodus, translated Red Sea in the Bible, he identifies as the Gulf of Akaba, and he is inclined to look for Mount Sinai "on the borders of Midian and Edom, among the ranges of Mount Seir, and in the neighbourhood of the ancient sanctuary of Kadesh-barnea, whose site at 'Ain Qadis has been rediscovered in our own day."

Local Museums in the Russian dominions in Asia.—A new geographical, anthropological, and archæological museum is to be opened at Vladikavkaz. There are already some very interesting ethnographical collections which have been given to the museum. The local museum at Minusinsk in East Siberia is steadily developing; it appears from its catalogue that it represents very well the natural history and geology of South Yeniseisk, as well as its stone and bronze age relics, and some of the petty trades of the present population. The museum has also a good library. The society for the study of the Amur regions, which has its seat at Vladivostok on the Pacific, is also doing good work. The society has a small museum, and has made the beginnings of a library. The proceedings of the society are published in the local paper *Vostok*.

The West Siberian Branch of the Russian Geographical Society has 107 members, of whom 71 are in Omsk, and the remainder in other parts of the region. The Branch published last year one volume of Memoirs (*Trudy*), and took part in the organisation of the meteorological net. Five meteorological stations were established last year at Altaiskaya, Kolyvan, Biisk, Atbasar and Zoneiuregorsk.

AFRICA.

Orthography of Egyptian Place-names.—Dr. Bonola Bey, in a communication to the Khedivial Geographical Society, published in the *Bulletin* for May, discusses the question of the orthography of geographical names, with special reference to Egypt. After a statement of the schemes put forward for facilitating a consistent rendering of foreign names in other countries, he shows the peculiar difficulties which exist in Egypt, both as to the correct Arabic names and their transliteration into the Roman alphabet. Any scheme for use in Egypt must, he points out, consider both forms, as the official Egyptian papers are published in European languages. The author believes that a Government Commission should be charged with the preparation not only of a scheme, but of an index of names. To this committee, should it be appointed, Dr. Bonola wisely leaves the choice of the European language according to the phonetic system of which the Arabic names should be transliterated. He formulates his own conclusions thus:—(*a*) To prepare a geographical dictionary of Egypt in Arabic, edited carefully with special regard to the derivation and meaning of the names. (*b*) To prepare a universal geographical dictionary in Arabic, in which the names should be transcribed phonetically according to the language of each country. (*c*) To prepare a geographical dictionary of Egypt, with the names transcribed from the authentic Arabic form in Roman letters, according to a system to be arrived at by the Commission.

The Ruins of Kilwa.—H. F. von Behr gives, in a recent number of the *Deutsches Kolonialblatt*, a description of the ruins on the island of Kilwa Kissiwani, East Africa, south of the modern town. The greater number of the ruins belong to the last of the three main epochs in the history of the place, the modern Arab, which dates from the expulsion of the Portuguese, between 1680 and 1690. The Arab town occupied the north side of the island; but nothing in the remains points to its having surpassed in style of architecture the modern towns on the same coast. The ruins of two mosques a little further south seem rather older, but do not by any means deserve the praise bestowed upon them by Von der Decken. An imposing fort on the north-west coast is said to have been built by Said Said at the beginning of the present century, but seems only to have been used for holding slaves. In spite of their greater age, the remains of the Portuguese fortress on the west side

are in better preservation. This must have been an important stronghold, and shows signs of having been built by skilled architects. Chance led to the discovery by the writer of a hitherto unnoticed ruin occupying a particularly strong position on the west coast. This appears of much greater age than any of the others, and may possibly date from the old Arab and Persian epoch.

The District of Lourenço Marques.—From the Annual Report on the consular district of Lourenço Marques, we learn that the trade of this district during the year 1892 has been most unsatisfactory. There is not, and never has been, any genuine trade at the port, owing to the fact that the surrounding country is perfectly undeveloped, and that throughout the district there are no enterprises to be supported. The harbour of Delagoa Bay, on the north side of which the town of Lourenço Marques is situated, is well known as the finest in South Africa. The outer bay extends along the coast north and south for a length of some 70 miles between 25° 20′ and 26° 20′, and its width, from the coast to the entrance of the inner harbour, is about 28 miles. From the northern extremity to Inyak Island, north of Inyak peninsula, a line of shoals extends, between which good channels exist. The inner harbour extends from Reuben Point to abreast of Matolla River, with a length of 7 miles, and average width of 1 mile. The Rivers Tembe, Umbelus, and Matolla discharge into the inner harbour, the two former being navigable for a considerable distance from their mouths. Owing to the heavy drought during the last two years, the mealie crop has been an entire failure. The syndicate formed in Lisbon to develop the pearl fisheries commenced operations last year. The district conceded for the pearl fishing extends from the mouth of the Sabi River, 70 miles south of Sofala, to about the twenty-second parallel of south latitude near Cape San Sebastian, an extent of about 120 miles. Operations for the present are being carried on at the group of islands known as Bazaruto. These islands lie a few miles off the coast below Sofala and the Sabi River, in long. 38° E., and lat. 22° S. Large coal deposits are said to exist in this district. Great progress is being made in the construction of the line of railway from Lourenço Marques to Pretoria. The Portuguese section, 56 miles in length, has now been completed for about three years. At the end of last year the railway was finished to Alkwaar, about 140 miles from the port. The total length of the line from Lourenço Marques to Pretoria will be 346 miles, and is expected to be completed before the end of 1894.

AMERICA.

Salton Lake.—Mr. Jacques W. Redway sends the following:—Late advices concerning Salton Lake, in the south-eastern part of California, show that this old basin is again refilling. In May, 1891, through the courtesy of the editor of the *Proceedings* of the Royal Geographical Society, I published a description of this lake and the manner of its sudden formation. At the time it was my belief that the Colorado River would keep one of its channels into the Colorado desert permanently open. The current, however, was unable to cut the channel down to the low-water level of the river, and Salton Lake finally almost disappeared. So great is evaporation in this region that not even the whole volume of the river would suffice to fill entirely the area below sea-level to leave the area below the low-water datum plane of the river out of consideration altogether. With a shade temperature ranging from 100° to 122° and the humidity 15 per cent. to 20 per cent. of saturation, evaporation will be the most potent factor in preventing the formation of a permanent lake there. Mr. E. W. Lang informs me that the water in two large streams is debouching from the

Colorado into the desert, but whether the area involved will be as great as that covered two years ago, is a matter of conjecture only. The present inflow I believe to be due mainly, if not wholly, to the unusually heavy snowfall in the mountain slopes, drained by the head streams of the Colorado. It will be remembered that the river in this locality practically flows around the side of a hill, and when, at high-water stage, it overflows, the overflow of necessity takes place on the down-hill side, and the surplus of water escapes to the desert to the westward. When the overflow of two years ago occurred, one of the channels, New River, through which the surplus escaped, was a channel that had probably served the same purpose many times before. New River now contains running water at a distance of 40 miles from the Colorado, and a number of large lagoons between the Colorado and the lake have already filled. The channel of Carter River, another old swale, has been cleared out, and is running bank full. The largest lagoon had, at the time of my information, a surface of about 100 square miles already covered with water, and as soon as the low ridge that separates it from Salton Lake is broken down, the overflow will again make its way to the latter depression. For many years the Colorado has been depositing obstructions in its own way, and it is a question of time only when the line of least resistance will lie—not towards the head of the Gulf of California, but in the direction of Salton Lake.

The Lakes of Minnesota.—In a paper by Mr. C. W. Hall, in *Science* (vol. xxi. p. 314), a short classification of the lakes in Minnesota is given. Some of these occupy rock basins, others are expansions of slow flowing rivers caused by bars of silt deposited by more rapid tributaries, and a third class are formed in hollows of the glacial drift deposit. The origin of these in gravelly ground is attributed to the washing in of fine silt, which gradually rendered the bottom watertight and retained a shallow sheet of water. The high temperature of these shallow lakes in summer leads to the vigorous growth of water-plants, which form a thick vegetable mould, and rapidly fill up the lake converting it into a meadow. Many of the lakes in which the earlier settlers in Minnesota fished or shot waterfowl, are now either covered with hayfields, or converted into extensive marshes in which the formation of soil goes on apace. The rapidity of the changes on the margin of some of the deep English lakes where circumstances favour the deposit of *débris* by rivers, enables one to understand how readily a large shallow area may be entirely converted into dry land by this means.

Travels in Peru.—Mr. A Baraillier has published an account of a journey to Andamarca and Pangoa in the Geographical Journal of Lima. He started from Jarya on May 12th, 1891, and travelled to Jesus-Maria, a distance of about 168 miles. Comas, the capital of the district, is a poor place with wretched inhabitants. The region known as Chin-con (*i.e.*, intense cold) lies between Comas and Andamarca. There are marvellous legends about silver mines known only to a few shepherds, who fear to divulge their secret, since they firmly believe they will be punished with instantaneous death. The reports appeared to have some foundation, as Mr. Baraillier saw an extraordinary rich piece of ore brought by an Indian to the Hacienda of Runatullo. Andamarca is built on a kind of plateau, and has about five hundred inhabitants. Judging from the ruins, it must have seen better days, but at present there are only three or four habitable houses. Mr Baraillier went from Andamarca to Pangoa: he travelled chiefly on foot up the stony ascent, and had to ford four rivers, *i.e.*, San José, Santiago, Playa, and Mariposa. He crossed a fifth on a natural bridge of fallen trees, and finally reached Pangoa, a hamlet lost in the immensity of Montereal. It is surrounded by small plots of land, on which are cultivated the cocoa, coffee, and tobacco plants, and the sugar-

cane; the principal products are rice and coca. The Rio Grande or Rio Pangoa runs 6 miles east of the village. On the opposite shore live the Chunchos, in low huts, and their rafts are tied at the water's edge. They are divided into two tribes, red and black, according to the colour they paint themselves with. The red are friendly, and often come to Pangoa to effect exchanges; they are tall and athletic. The black Chunchos are a race of reputed cannibals; they are constantly at war with their neighbours, and are supposed to eat their prisoners; they worship the sun, like the Incas, so they may possibly be descendants of tribes who fled away from the greedy Spanish gold-seekers. Mr. Baraillier considers Pangoa to be a ramification of the great Pampa of Sacramento, which forms the greater part of Brazil, and merges in the south into the Argentine Pampa, which extends to the Straits of Magellan. Here one recognises the two extraordinary characteristics of South America, *i.e.*, vast fertile plains, rich in agricultural products, and also mineral wealth hidden in the snow-clad and inaccessible Cordilleras. At Pangoa the most valuable trees and plants grow luxuriantly; the sugar-cane grows flowers and yields in eight months; cocoa yields four harvests a year; it is the most valuable product, and can easily be exported, by the River Pangoa, which is navigable to the mouth of the Amazon. The tobacco compares favourably with that of Havana. The fauna of Pangoa comprises every known animal, and the sight described by Mr. Baraillier of a moonlight night in the forest seems to be quite unique. Mr. Baraillier speaks of Pangoa as an earthly paradise, except for the low character of the natives, suggests that a scientific exploration should be undertaken, and that the Peruvian Government should open out roads in order to put the various towns in practical communication with each other. The region between Pangoa and Jesus-Maria is only known and inhabited by the Chunchos.

AUSTRALASIA.

Maori Names in New Zealand.—It is satisfactory to see that an effort is being made to perpetuate the euphonious native names of New Zealand, the correct forms of which are liable to be lost unless early steps are taken to secure them. In a letter to the New Zealand Institute, published in the *Auckland Standard*, Mr. J. S. Rutherford, of Whangarei, suggests that that body should prepare a map of New Zealand showing Maori names only. In urging the importance of this work and the risk of incompleteness through delay, he says:—"This would be of the greatest historical value, and, in fact, is almost the only way we can ever hope to retain the native names, and hand them on with any degree of purity. Every year past makes the task more difficult, as at all events in the southern portion of New Zealand the names are being fast forgotten, corrupted, or entirely lost, there being now only a remnant of the race living to whom an appeal can be made. When it is considered how carefully and minutely each bay and headland is named by the natives, in many cases far more appropriately than by the Europeans, who have fallen back on a clumsy repetition of names where there is no similarity of position or surroundings, and when it is remembered how often the native name is taken from some distinctive feature in the place, I think the value of such a document will be readily admitted."

The Coastland on the Gulf of Papua.—The Rev. James Chalmers contributes some notes of a journey along the coast of the Gulf of Papua to the recent numbers of the *Chronicle* of the London Missionary Society. Mr. Chalmers left Port Moresby last June for Motumotu, whence he coasted along in a whale-boat to the River Annie. He crossed the dangerous bar of the river, and anchored amid a

heavy inside swell and strong current at the village of Vailala. From Vailala a journey of about 15 miles took the party to the larger village of Orokolo, where there appeared to be a specially large and varied supply of food. As the surf at Orokolo looked dangerous next day, the boat was carried overland a distance of some 6 miles to the River Aivei. Thence a two hours' pull brought Mr. Chalmers to Apepe, a new village built by Maipuans on the west bank of the Arere River. The party left Apepe in the morning, and after a row of about 7 miles, crossed Port Blomfield, explored some distance up the Panaroa River, and crossed the mouth of the Urita in the afternoon. A halt was made up the river at the village of Koropanairu, where it was noted that, as there was no solid ground, the dead are placed on platforms in the mud beside the houses. Having crossed to the River Arai, Mr. Chalmers and his companions descended the stream to the village of Ukerave, where he had some difficulty in getting away, as he declined to burden himself with so much food as the natives wished to give in return for his presents. The natives everywhere were most friendly, and the genial missionary found them a particularly happy and humorous set of people when their suspicion of the strangers were allayed. Mr. Chalmers had been four months without letters when he wrote; he found that the deltaic channels of the Fly River would enable him to visit all the villages of the head of the gulf without going to sea, and felt keenly the want of a steam-launch, which has now been supplied.

Trade of Tahiti.—The Report on the trade of Tahiti for the year 1892, recently issued, shows a decrease during the year in both exports and imports. The exports from Tahiti, include bêche-de-mer, coffee, cotton, coconuts, vanilla, wool, wax, copra, oranges, and mother-of-pearl shell. The pearl shell fishery is an important industry of Tahiti. The Island of Tahiti, Moorea, the Leeward Islands, the Marquesas, &c., which at the present time produce only a few commodities for export, are capable of much greater agricultural development. The soil on all these islands is most fertile; they are well-watered, have good harbours, and apparently free from the scourge of gales of wind or hurricanes so injurious in most tropical countries. The lands and climate of Tahiti seem to be well adapted to the production of excellent coffee. This cultivation has already begun on a small scale in the Islands of Rurutu and Rimatara, and foreign enterprise also is at work in the Island of Tahiti. According to the census which was taken in 1887, the total population of the various islands forming the French establishments of Oceania was then twenty-four thousand four hundred and eighteen. The census taken in 1892 gives a decrease of two thousand three hundred and eighteen, which is partly accounted for by a reduction in the naval and military establishments of seven hundred and ninety-four men, and partly by a decrease in the Tahitian population.

Nine Island.—Mr. Harold Williams contributes to the March number of the *Journal of the Polynesian Society*, a vocabulary of the language of Nine, or Savage Island, supplemented by a description of the island and its inhabitants by Mr. E. Tregear. Nine is situated in the South Pacific in lat. 19° S. and long. 169° 21′ W. It is about 40 miles in circumference, and is nearly of an oval shape. The natives are of the fair Polynesian type, and greatly resemble the Samoans. They still cling to some of their ancient and innocent customs. Before the introduction of Christianity they were constantly at war with each other. At the present time the character of both Nine and its people differs much from that of the past. The population numbers five thousand and seventy, half of which are children. The island produces coffee, cotton, sugar-cane, arrowroot, and yams, of the finest quality, the soil being very fertile.

POLAR REGIONS.

Dr. Nansen's Expedition.—The following telegram, dated Berlevaag, July 21st, has been received from Dr. Nansen (Berlevaag is about 60 miles west of Vardö):—Leaving Vardö for Yugor Strait, where thirty sledge dogs will meet us. Will go along the Siberian Coast eastward, past Cape Chelyuskin to Olenets River, near the Lena, where another twenty-six dogs are waiting. We then turn towards the north. We hope to reach the west coast of the New Siberian Islands in the end of August, if the ice is not bad. The latest information about ice conditions there are favourable. We shall go straight northwards until fast in the ice. If we meet new land we shall follow it along the west coast northwards; when there is no more open water we shall drift with the ice. Everything has gone on well up to the present. The *Fram* is a splendid strong ship and will stand ice pressure well. She is deeply laden with coal, but will soon grow lighter. Accounts of the ice in the White Sea and Barents Sea are not favourable; there has been much ice, but I hope it is now better, as the ice changes quickly. I have good hopes. If we only get through the Kara Sea in good time I feel certain there are good prospects of success.

Lieutenant Peary's Expedition.—Lieutenant Peary left St. John's, Newfoundland, in the early part of July for Northern Greenland, *viâ* Smith Sound, his main object being, it is stated, to lay down the northern coast of Greenland. Lieutenant Peary is taking with him a supply of Eskimo dogs, eight Colorado donkeys, and twenty carrier pigeons. He has taken supplies for two years, including three tons of pemmican.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Seismology in Japan.—The Seismological Society of Japan, founded in 1880, closed a brief but active life in 1892. The cause of death having been apparently not so much lack of workers as of opportunities for their meetings, the publications of the defunct Society are to be continued in journal form under the editorship of Professor Milne. Vol. I., corresponding to Vol. XVII., of the Society's transactions, has just been issued, and contains eight papers, five of which are from the editor's pen. One of these discusses in detail the earthquake statistics of Japan for the year 1890, dealing with a total of 845 shocks—a frequency considerably above the average. In the province of Higo no fewer than 207 earthquakes were recorded, mostly following on the great earthquake of July 1889. Professor Milne's other papers deal chiefly with generalised results of previous work in seismology, and their application to the mitigation of earthquake effects. In conjunction with Mr. F. Omari, Professor Milne gives an account of experimental investigations on "the overturning and fracturing of brick and other columns by horizontally applied motion," and compares the results with the mathematical formulæ deduced by Mallet and others. Professor W. K. Burton contributes some notes on the applications of photography to seismology, and Mr. F. Omari on early Chinese earthquakes.

The Contraction Theory of Earth Movements.—Dr. R. Sieger of Vienna contributes to *Ausland* some notes on Suess's theory, which attempts to explain the formation of mountains and the elevation and depression of coast-lines by the contraction of the Earth's crust from cooling. This hypothesis first gained acceptance in France, and Suess himself refers to Prévost as anticipating his views. Günther has recently drawn attention to the work of Berzelius, who found it

possible to account for the elevation of the Scandinavian Peninsula by means of the contraction-theory alone, without recourse to the supposed changes of the level of the sea, deemed necessary by some investigations. But Dr. Sieger points out that the whole case was treated from almost the same point of view, and in almost the same manner, by F. W. Johnston so long ago as 1833. In the *Edinburgh New Philosophical Journal* for that year appears a paper "On a gradual elevation of the land in Scandinavia," in which Johnston finds in the cooling of the Earth a cause which "not only suffices for the formation of mountain-ranges, but explains the general elevation of the Scandinavian Peninsula."

Martin Behaim and the Astrolabe.—Eugen Gelcich, who at the Columbus celebration at Hamburg dealt with the state of nautical science at the close of the 15th century, attempts (*Mittheilungen*, Vienna Geog. Soc., xxxvi., p. 100) to remove the obscurity which has hitherto involved the question of the part taken by Martin Behaim in the introduction of improved methods of observation at sea. Humboldt and Peschel, followed by other writers, held that the use of the cross-staff was learnt by the Portuguese from the Arabs in the Indian seas, and so introduced into Europe. Breusing, having shown that this was due to a mis-reading of a passage of Barros, pointed out that the cross-staff had been described as early as 1472 by Regiomontanus, whose pupil, Martin Behaim, attended the Junta summoned by John II. to suggest improvements in the methods of nautical astronomy, and probably carried the knowledge of that instrument into Portugal. The improvements introduced by the Junta concerned the instrument only, according to Breusing, as sufficiently accurate tables of the sun's declination already existed. In support of his argument he cited the passage of Barros which states that the Arabs used an instrument of their own, for the same observations for which the Portuguese then used the cross-staff. These views, which met with general acceptance, are rejected by Gelcich, for reasons which may be summarised thus:—(1) Barros, in describing the improvements brought in by the Junta, speaks only of *Astrolabes*, noting the greater accuracy obtained by the new method over that in which the large wooden *Astrolabes* were still used. Da Gama, who took with him a large wooden Astrolabe and smaller ones of brass, found the former untrustworthy at sea. (2) Barros wrote sixty years after the assembly of the Junta, and a correct rendering of his statement as to the use of the cross-staff by the Portuguese for a certain observation shows that he was speaking of what was the case in his day. Now we know from Nonius that the cross-staff was then not used for observation of the sun's altitude, for which it had proved unsuitable, but for that of the Pole star. (3) Neither Columbus, Magellan, nor any other navigator or writer on navigation until late in the 16th century mentions the cross-staff as used at sea. (4) Regiomontanus was not the inventor of the cross-staff, which had been described as early as the 14th century by the Spanish Jew, Levi Ben Gerson. (5) The previously existing tables involved laborious calculations, which those newly issued by Regiomontanus, probably put in a more practicable form by Behaim, would obviate. Gelcich therefore concludes that the cross-staff was not used for observing the sun's meridional altitude in Behaim's time, but that the title of the latter to distinction rests on his introduction of more handy brass astrolabes in place of the large wooden ones, and the preparation of tables which would bring the practise of navigation within the reach of a far wider circle than previously.

Ville-Timchenko's Water-Bottle.—*The Memoirs (Trudy) of the Novorossian Society of Naturalists* (vol. xvii. No. 2, 1892) contain a description of the water-bottle which was used by the Black Sea expeditions in 1890 and 1891. It is a modification of Ville's bathometer by M. Timchenko. The apparatus consists of a copper

cylinder, slightly widened in its middle, like a cask, gilded inside, and having openings at both ends. Each of the two ends is shut by a lid, attached to a screw, which is set into motion by a propeller. When the instrument goes down, the two propellers rotate one way and extend the screw till they have thrown the two lids wide open, so that water freely passes through the instrument. But when it is pulled upwards, the propellers, turning the other way, at once shut the valves. The cylinder, the stoppers, and the propellers are placed in another wider cylinder. The apparatus has been well tested, and is considered as fully trustworthy. It has received the name of Ville-Timchenko's bathometer.

Denudation in Deserts.—At the tenth meeting of German geographers (Stuttgart, April 1893), Prof. Dr. Walther of Jena read a paper on denudation in deserts. He showed that the customary views which we have of a desert are often quite different from the actual physical features of such countries. Denudation consists of two different factors, viz., the decomposition of the surface, and the removal of the decomposed products. If decomposition is but small, the transporting agents need not be of great force in order to remove all the products of the former. But in many cases these products are very considerable, as even the hardest rocks may be decomposed by physical influences, such as insolation and great and sudden changes of temperature, or by chemical reagents which prevail chiefly in deserts where the amount of sand is but limited. Rain is of rare occurrence in deserts, and its influence upon denudation is only of subordinate importance. Much more vigorous transporting agents are the winds which often blow with great force; but rocks are worn and destroyed much less by the mere friction of sand-laden winds, than by deflation, the effects of which are the important factors of denudation, wherever the transporting force of the winds surpasses the action of the water. Prof. Walther, who has made the study of deserts his speciality, proved his statements by many observations which he had made in the Sahara, on the Sinaitic Peninsula, and in the deserts of North America.

GENERAL.

Instructions for Travellers.—At a meeting of the Professors of the Paris Natural History Museum, it was decided to form for the year 1893 a course of special instruction for travellers. The advantage of a similar institution had been recognised by the naval authorities, who in 1886 had requested Professor Pouchet to draw up a treatise on the "Récolte des objets d'histoire naturelle à la mer." In the Museum this teaching had for a long period actually been established and had progressively developed before receiving official consecration. In 1876 Professor Hamy had started a series of lectures, which are still continued, and which were attended by many travellers, among whom may be mentioned, MM. de Brazza and Harmand. To special instruction in anthropological research M. Hamy had added a few lessons in photography, lessons which he proposed to continue this year. The learned professor will thus fill up a more apparent than real blank in the syllabus. Besides, the example of the professor of Anthropology had been followed by Professor Bureau. The new instruction is to be essentially practical. The professors will aim at giving merely *simple* directions to their students, and at showing them none but easy manipulations, which could be carried out where no laboratory is available. They only intend to teach travellers how to gather and how to preserve collections, and how to avoid overburdening themselves with worthless objects. Thus many a disappointment will be saved. Demonstrations in the laboratories will teach how to practically apply what is learnt in the lectures; special attention will be devoted to the collection of specimens in the

field. Thus M. Charles Brongniart will take his students in the neighbourhood of Paris to gather insects; while M. Ramond will show them how to draw up a geological section. In a word the purpose of this course of lectures is to enable the traveller to collect usefully for science. Let us hope that this attempt will lead to the formation of a real school of *travellers* who are *naturalists*, and for whom the publication of the lessons given in 1893 would immediately prove a most valuable guide. The first course was given from April to June last, and included the following:—Opening Lecture, Prof. Milne-Edwards; Anthropology, Prof. Hamy; Ethnography, Prof. Verneau; Mammiferous Animals, Prof. Oustalet; Fishes and Reptiles, Prof. Vaillant; Birds, Prof. Oustalet; Compared Anatomy, Prof. Pouchet; Worms and Zoophytes, Prof. Bernard; Insects and Crustaceans, Ch. Brongniart; Molluscs, Prof. Perbier; Botany (phanerogams), Prof. Bureau, Botany (cryptogams), Van Tieghem; Living Plants, Prof. Cornu; Paleontology, Prof. Albert Gaudry; Geology, Prof. Stanislas Meunier; Meteorology, Prof. Danie; Berthelot; Mineralogy, Prof. Lacroix; Travellers' Hygiene, Prof. Gréhant. During the practical lectures given in the laboratory, or in the field, the students were initiated into the art of gathering and of preparing collections.

The Navy Records Society.—A society, newly formed, under the name of the Navy Records Society, proposes to print rare or unpublished works relating to the Navy, with the aim of establishing the history of our Navy on a sure foundation. Their Royal Highnesses the Duke of Edinburgh and the Duke of York are patrons of the Society, and Earl Spencer, the present First Lord of the Admiralty, is the president. It should be understood that the Society is neither exclusively nor, indeed, mainly, naval in its constitution; and that any person, library, or club, approved by the Council is eligible as a member. Application should be made to the Secretary, Professor Laughton, at Catesby House, Manor Road, Barnet. The first publications will most probably be papers relating to the war with Spain, 1587–8, edited by Mr. J. K. Laughton; and Hood's letters, 1780–3, edited by Mr. D. Hannay.

CORRESPONDENCE.

The "Island of Sultana."

SEA PARK, WICKLOW, *July 10th*, 1893.

I have two copper coins of the East India Company, dated respectively 1805 and 1835, which in addition to the arms and supporters of the Company and the date, bear the words "Island of Sultana." I have made many inquiries both from numismatists and geographers, and so far have been able to obtain no trustworthy information as to the whereabouts of this island. The maps of the Society have been hunted over in vain, but the name cannot be found. The theory among numismatists is that the name refers to Sumatra or Labuan. I should be greatly obliged to any Fellow of the Society or reader of the *Journal* who will kindly give me any definite information as to where the island is, or, if it has been rechristened, what its present name is.

H. LESLIE ELLIS.
Lieut.-Col.

Hannibal's Vinegar.

16, TRINITY ROAD, TULSE HILL, *July 11th*, 1893.

Whilst in Colombo in March last in the course of a trip to the East my attention was accidentally directed to a substance called "Cabook,"

which is used extensively there for building purposes, taking the place of brick.

I was told that "Cabook," is decayed rock, and is found both on the surface and below the soil. It hardens in the sun, and is usually limed over when used for building houses. It is said to be a favourite substance with burglars, as it offers little resistance to their attacks.

Burglars, said my informant, having selected a house on which to operate, bring with them a chatty containing one or two quarts of vinegar. They remove the lime and puddle the vinegar on to the "Cabook," a process which softens it and makes it like mud. They are then able with an iron tool to work a hole through the "Cabook" and into the building, the whole process, in many instances, lasting not more than fifteen minutes.

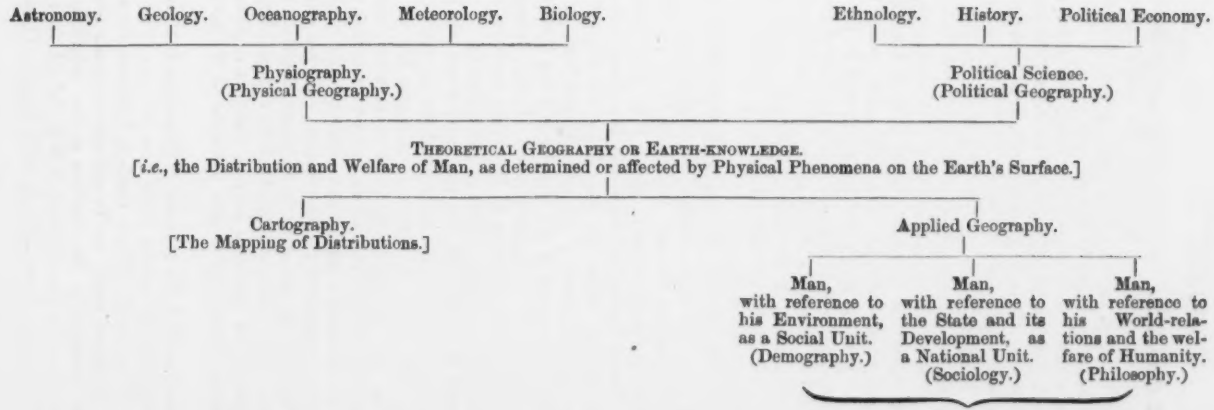
The incident seemed to me to throw some light on this discussion, and to show the possibility at least of Livy's story, and it is a curious confirmation of the extract from Dion Cassius, quoted at p. 175, Vol. I. of *The Geographical Journal*. It may, however, be already well known to you, so I give it with all possible diffidence.

S. Horace Candler.

The Position of Geography in the Cycle of the Sciences.

In the accompanying Table I have endeavoured to define the position occupied by Geography in the Cycle of the Sciences. If these relations between Geography and the allied sciences were clearly understood, it would be helpful both to teachers and students, and lay the basis for the construction of a text-book on Theoretical or Scientific Geography, which, in my opinion, has yet to be written. It is true that there are and have been writers on Geography who have treated their subject-matter in a thoroughly scientific manner, and there are others who have clearly explained what Geography is *not*. What we want, however, is a clear exposition of the field and scope of Geography and of its relation to other sciences. If any such exposition has been made it is unknown to me, though I am aware that in Germany and elsewhere the science of Geography is thoroughly understood and has been exhaustively criticised.

In this country Geography is discredited because it is imperfectly understood and inadequately taught; it is regarded as a *graphy* and not as an *ology* at all. The reason of this is because Geography is used merely as a vehicle of description and not as a body of thought. No tax is laid on the reasoning powers of the student, and therefore the subject, in its empirical aspect, is all but worthless in any system of education. Although general principles are understood and applied, as pertaining exclusively to the department of Geography, they have not yet been grouped and classified, far less have they been embodied in any published system of teaching. Teachers, for the most part, have had to evolve a system for themselves—a system that is liable to error on account of the personal equation. What they require is what all established sciences already possess, a standard text-book that very clearly defines the principles of Geography and their practical application, for Geography has both a practical and a theoretical side. All else, so far as Scientific Geography is concerned, must either encroach upon other sciences or be a disjointed and an eclectic epitome of them.


Astronomy.
Geology.
Oceanography.
Meteorology.
Biology.
Physiography.
(Physical Geography.)
Ethnology.
History.
Political Economy.
Political Science.
(Political Geography.)
Theoretical Geography or Earth-knowledge.
[i.e., the Distribution and Welfare of Man, as determined or affected by Physical Phenomena on the Earth's Surface.]
Cartography.
[The Mapping of Distributions.]
Applied Geography.
Man, with reference to his Environment, as a Social Unit. (Demography.)
Man, with reference to the State and its Development, as a National Unit. (Sociology.)
Man, with reference to his World-relations and the welfare of Humanity. (Philosophy.)

Geography is shown in the above Table to draw its facts from eight elemental or derivative sciences, and to group these facts under two divisions, from which general principles are deduced. This forms the Theoretical side of Geography. Its Practical side is sub-divided under two heads: (1) Cartography, in itself a distinct science, involving Mathematics; and (2) Applied Geography, which takes account of Man in his three characteristic aspects—towards his Home, towards the State, and towards the World—and considers them in conjunction, their more precise definition being left to three other sciences for separate treatment.

Arthur Silva White.

OBITUARY.

Sir George Tryon, K.C.B.—While, by the appalling catastrophe of the *Victoria*, the country lost, in Sir George Tryon, one of its most valued and accomplished servants, this Society has been deprived of a highly-prized associate who had been one of ourselves for more than a quarter of a century.

George Tryon was of an ancient Northamptonshire stock, the third son of Thomas Tryon Esq., of Bulwick Park by Anne, daughter of Sir John Trollope, Bart., and sister of the first Lord Kesteven. Born in January, 1832, he entered the Navy in 1848, after a longer period of schooling than fell to the lot of most young naval officers in those days. He began his career on the West Indian station, under the auspices of Admiral the Earl of Dundonald, the renowned Lord Cochrane of Basque Roads. After two years he was transferred to the Mediterranean, being employed as midshipman on board the *Vengeance*, under Captain Lord Edward Russell, at the breaking out of the Crimean war. He went thence to the *Britannia*, the flag-ship of Admiral Sir Deans Dundas, and served in the Naval Brigade before Sebastopol, when he was wounded, and at the capture of Kinburn. After the peace Tryon remained on board the *Royal Albert*, the flag-ship of Lord Lyons, and he was promoted to the rank of lieutenant for his war services, in October, 1854. Four years afterwards he was selected for the Royal Yacht, which ensured him his commander's step after two years.

Thirty years ago that great revolution in the constructive department of our navy was commenced, before which the wooden walls of old England were destined to disappear. The first ironclad was the *Warrior*, commissioned by our associate Captain the Honourable Arthur Cochrane, in 1861; and it is no small tribute to the brilliant attainments of George Tryon that he should have been selected as Commander of the *Warrior*, serving under the son of his old Admiral, Lord Dundonald. He was only twenty-eight years of age, and had just been promoted to his commander's rank. After some years in the *Warrior* she was paid off, and Tryon was appointed to the *Surprise* in the Mediterranean. He was, through life, an ardent sportsman, and during this commission he had many opportunities, on the coast of Albania and elsewhere, of indulging in his favourite pursuit.

Tryon attained his post-rank in April, 1866, and two years afterwards he was specially selected by the Treasury to organise and superintend the transport department during the Abyssinian war. When he arrived in Annesley Bay he found everything in a chaotic state. But he had a genius for organisation, attending personally to every detail, and seeing himself that all his orders were carried out as he intended. The transport service became regular and efficient under his hands, and the value of his work was recognised by the Government. He was created a Companion of the Bath. Although he was strict in enforcing obedience to his regulations, and sometimes even severe, his considerate kindness and genial manner won him the respect and regard of the numerous body of transport captains, who presented him with a handsome piece of plate after the close of his service in Annesley Bay.

In 1869 Captain Tryon was married to the Honourable Clementina C. Heathcote, daughter of the first Lord Aveland, her mother being 21st Baroness Willoughby d'Eresby in her own right. They rented Tickhill Castle in Yorkshire for a short time; but such an officer as Tryon could not be allowed to remain long unemployed. He was Private Secretary to Mr. Goschen at the Admiralty from 1871 to 1874, and in the latter year he commissioned H.M.S. *Raleigh* for a three years' service in the Mediterranean. From 1878 to 1881 Captain Tryon com-

manded H.M.S. *Monarch* on the same station, serving on the coast of Tunis at the time of the French occupation, and acting as a member of the Sfax enquiry commission. He was specially complimented by the Admiralty on the admirable order of the *Monarch* when that ship was paid off in 1881.

Tryon was now looked upon as one of the most prominent officers in the navy. A thorough seaman and able diplomatist, he was also a skilful organiser, and he had acquired considerable administrative experience at the Admiralty. He was a man of strong personality, and exercised great influence over the minds of others. From 1882 until he attained flag-rank in 1884 he held the important post of Permanent Secretary to the Admiralty, and since 1878, or before, his mind had been specially turned to the questions connected with fleet manœuvres and tactics. His decided inclination was to the side of that school of thought, in the navy, which was less in favour of exact experiment with individual ships, and more disposed to rely upon the eye and the judgment, and on plenty of practice in the conduct of fleet manœuvres. Many other questions bearing on the welfare of the navy exercised his thoughts and occupied his pen at this time.

In 1884 Tryon became a rear-admiral, and went out as commander-in-chief on the Australian Station with H.M.S. *Nelson* as his flag-ship. During the next three years he did most important service in organising the system of local naval defence for the Australian colonies, and, in his position as admiral, in doing his best to draw closer the ties between the colonies and the mother country. Returning home, it was a national loss that his candidature for the Spalding division of Lincolnshire should have been unsuccessful; for his knowledge on naval and colonial questions would have been most valuable in the House of Commons. In 1887 he was created a K.C.B., and in the following year he was appointed Superintendent of Naval Reserves, a post which he held for three years. Here his talent for organisation had an excellent field for its exercise, while his ability as a naval tactician was displayed during the manœuvres of 1888, 1889, and 1890. While Superintendent of Naval Reserves he became a vice-admiral, and in September, 1891, he was appointed commander-in-chief of the Mediterranean fleet, with his flag on board H.M.S. *Victoria*. He had held that honourable position for a year and nine months at the time of his lamented death on June 22nd. The feeling of those who had the privilege of serving under him is well expressed in the concluding paragraph of the despatch from Admiral Markham reporting the disaster, where he refers to "the great and irreparable loss that the navy and the nation have sustained in the death of our beloved commander-in-chief, Sir George Tryon, K.C.B., whose kindness of heart, no less than his signal ability in that profession of which he was such a distinguished ornament, had endeared him to all who served under his command."

Sir George Tryon became a Fellow of this Society in 1867, soon after he obtained post-rank and just before he went out to Abyssinia. He continued to take a friendly interest in the welfare of the Society, and he twice very nearly became a member of our Council. But he felt that he would be unable to devote that amount of time to the duties which he invariably gave to everything he undertook. It must, however, always be recognised that the large number of our Fellows who are, like Sir George Tryon, unable from their other occupations, to take an active part in our affairs, still form a most valuable section of our body. The interest they take in geographical science is extended to others who are under their influence, and the welfare of the Society, and of the science to which it is devoted, is thus quietly, but surely and continuously promoted by them. In the loss of so distinguished and so influential a Fellow, while we share the sorrow of the whole nation, we thus have special reason for regret. Sir George's grasp of the subjects that interested him, and

his conversational powers, which were of a high order, caused his influence to be widely felt. But his memory is endeared to all who served under him, by his generosity, his large-heartedness, and his considerate treatment of officers who were in trouble. When a very distinguished officer recently had an accident with his ship, he entered Sir George Tryon's room, for his first interview afterwards, in fear and trembling. When he came out he was heard to say—"One would have thought that it was the Admiral who was in trouble, and not me." His last wish was that no one should be unjustly blamed for his error, and his last most noble words expressed that wish. Sir George Tryon had a numerous circle of attached friends who will deeply feel his loss. Many an act of warm-hearted kindness will be remembered by them; and among others the present writer may venture to express his grief at the loss of a very old friend, and his admiration of the noble and generous character whose memory will long remain with us. C. R. M.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1892-93.

Fourteenth Ordinary Meeting, June 26th, 1893.—General R. STRACHEY, R.E., C.S.I., F.R.S., Vice-President, in the Chair.

ELECTIONS:—*John Barker, C.E.; John Edward Blunden; Harold Michell Courage; Thomas Robert Dewar; General Mathew Gosset; C. B. Graves; W. H. Grenfell, M.P.; Captain E. S. Guilding, D.A.A.G.; G. H. Hodges, J.P.; T. Elliott Lochner; J. Sadler-Wood; William Henry Sheppard; Gilbert Stevenson; Henry W. Taunt; Thomas J. Taylor; Thomas Tweddell; Theodore Uzielli.*

The Paper read was:—

"Kurdistan." By Captain F. R. Maunsell, R.A.

There was an exhibition of photographs, maps, botanical specimens, &c., in the tea-room.

Special Meeting, July 3rd, 1893.—General R. STRACHEY, R.E., C.S.I., F.R.S., Vice-President, in the Chair.

ELECTIONS:—*C. B. Barnes; R. B. Barron; William John Bowden; W. Orr Duncan; Colonel W. Everett, C.M.G., A.A.G.; Edward Arthur FitzGerald; Captain Richard Ford (late Rifle Brigade); James Herbert Hugh Harrison; Ralph Head; O. H. Howarth; Frederick Hall Kirby; Lieut. G. M. Kirkpatrick, R.E.; David Harry Leverson; Bruce Morison; William H. Mullens, M.A.; Colonel A. Paget (Scots Guards); Parke Mayhew Pittar; Douglas Parker; Alfred Parminter; Thomas Redmayne, M.A., M.D.; Septimus Rivington; Lt.-Colonel Herbert Anthony Sawyer, I.S.C.; Arthur Serena; Joseph Vaughan Turner; Richard Wyndham Vaughan, C.E., &c.; Ernest Edward Wild, B.A., &c.*

The Paper read was:—

"Journeys in the Pamirs and Central Asia." By the Right Hon. the Earl of Dunmore.

There was an exhibition of paintings, objects of natural history, and curios in the tea-room.

Special General Meeting, July 3rd, 1893, General R. STRACHEY, C.S.I., F.R.S., *Vice-President, in the Chair.*

This meeting was summoned by the Council by the following notice, which was sent to all Fellows in the United Kingdom:—

June 19th, 1893.

In order to give effect to the understanding come to at the Anniversary Meeting, that an early date should be fixed for calling a Special General Meeting to consider the proposal made by the Earl of Mayo to the effect that ladies should be admitted as Ordinary Fellows, the Council now give notice that a Special General Meeting for the above purpose will take place on Monday, July 3rd, at 3.30 P.M., at the University of London, Burlington Gardens (by permission of the Senate).

At this meeting the Earl of Mayo will move the following resolutions:

Chap. II., para. 1, of the Society's Regulations.

"To add at the end of the paragraph the words, 'Ladies are eligible as Ordinary Fellows.'"

Interpretation clause to be added at end of Rules:

"Whenever required in these Regulations or the Appendix thereto, words importing the masculine gender only shall include the feminine gender."

The following amendment to Lord Mayo's resolution will be proposed by Mr. William Hicks:

"That without expressing any opinion as to the status of those ladies already elected by the Council, this Meeting of the Royal Geographical Society considers it inexpedient to admit ladies as Fellows."

It is the hope of the Council that all Fellows able to do so will attend the meeting, and that any decision come to may be regarded as conclusive, and will not be further challenged.

The Council being desirous that the question shall be decided in conformity with the wishes of the Fellows at large, have abstained from adopting any resolution upon it in their collective capacity, reserving, however, to all of their number free exercise of their individual opinions.

DOUGLAS W. FRESHFIELD, H. SEEBOHM } *Hon. Secs.*

After some introductory remarks by the Chairman, the Earl of Mayo moved the resolutions of which he had given notice, viz., in Chapter II., paragraph 1, of the Society's Regulations, "To add at the end of the paragraph the words 'Ladies are eligible as Ordinary Fellows.'" Interpretation clause to be added at end of Rules—"Whenever required in these Regulations, or the Appendix thereto, words importing the masculine gender only, shall include the feminine gender."

Sir Frederick Young seconded Lord Mayo's motion.

Mr. William Hicks moved the amendment, of which he had given notice, viz.:—

"That without expressing any opinion as to the status of those ladies already elected by the Council, this Meeting of the Royal Geographical Society considers it inexpedient to admit ladies as Fellows."

This amendment was seconded by Admiral Sir Vesey Hamilton.

The Chairman ruled that as Mr. Hicks's amendment was a direct negative to Lord Mayo's motion, the latter should be put first.

On the vote being taken, the result was announced by the Chairman as follows:

In favour of Lord Mayo's motion	158
Against	172
Majority against	14

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, &c., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps. *Deutsche Rundschau* **15** (1893): 433–437. **Böhm.**

Eintheilung der Alpen. Von Dr. August Edlen v. Böhm. *With map.*

Austria—Geology of Tyrol. **Ogilvie.**

Contributions to the Geology of the Wengen and St. Cassian Strata in Southern Tyrol. By Maria M. Ogilvie, B.Sc. [*From the Quarterly Journal of the Geological Society*, vol. xlix. (1893), p. 1.] *With maps and sections. Presented by the Author.*

Italy—Monti Pisani. *Le Globe, Bull.* (1893): 217–233. **d'Arcis.**

Les Monts pisans, M. Arthur d'Arcis.

The Monti Pisani are a small chain of mountains situated to the north-east of the town of Pisa.

Portugal. **Vasconcellos**

Sur les Religions de la Lusitanie.—Sur les Analistes portugaises. Abrégé de Mémoires destinées à la 10ᵉ Session du Congrès international des Orientalistes. Par J. Leite de Vasconcellos. Lisbonne, Société de Géographie, 1892. *Presented by the Geographical Society of Lisbon.*

Notes on the religions of the peoples inhabiting the countries in the west of the Spanish Peninsula, from the most ancient times to the establishment of Christianity, with indications of the geographical distribution of some of the most important monuments.

Portugal—Place Names. **Vianna.**

Deux faits de Phonologie historique portugaise. Mémoire présentée à la 10ᵉ Session du Congrès international des Orientalistes. Par A. R. Gonçalves Vianna. Lisbonne, Société de Géographie, 1892. *Presented by the Geographical Society of Lisbon.*

Some observations on the old pronunciation of Portuguese words and rules for transliteration into Portuguese of Arabian names, and orthography and pronunciation by the Arabs of place names.

Scandinavia. *Z. Ges. Erdk. Berlin* **28** (1893): 1–122. **Sieger.**

Seenschwankungen und Strandverschiebungen in Skandinavien. Von Dr. Robert Sieger.

An elaborate work on earth-movements in Scandinavia.

Spain. **Fabricius.**

La première invasion des Normands dans l'Espagne musulmane en 844.—La connaissance de la Péninsule espagnole par les Hommes du Nord. Mémoires destinées à la 10ᵉ Session du Congrès international des Orientalistes. Par le Professeur Adam Kristoffer Fabricius. Lisbonne, Société de Géographie de Lisbonne, 1892. *Presented by the Geographical Society of Lisbon.*

These memoirs are the subject of a special review.

United Kingdom—Trade. *J. R. Statistical S.* **56** (1893): 185–214. **Bourne.**

Progress of the External Trade of the United Kingdom in Recent Years. By Stephen Bourne.

ASIA.

Armenia. *Globus* **63** (1893): 349–352. **Belck.**

Untersuchungen und Reisen in Transkaukasien, Hoch-Armenien und Kurdistan. Von Dr. Waldemar Belck. *Map.*

India—Irrigation. **Buckley.**

Irrigation Works in India and Egypt. By Robert Burton Buckley, Superintending Engineer, Indian Public Works Department. London, E. & F. N. Spon, 1893: size 10½ × 7½, pp. xvi. and 348. *Many maps and plates. Price* £3 3*s. Presented by the Secretary of State for India.*

This large volume gives details regarding the methods of irrigation employed in India and Egypt, the various works being minutely described by the aid of numerous sectional diagrams, and by maps of the regulated rivers and canals. The large-scale maps of river-basins and deltas give a certain geographical value to the book apart from its importance as a contribution to engineering literature.

India, Punjab—Ambala District. ——

Gazetteer of the Ambala District, 1892–93. Compiled and published under the authority of the Punjab Government, 1893: size 9½ × 6½, pp. v., 156, and xliii. *Presented by the Secretary of State for India.*

India, Punjab—Hissar District. **Fagan.**

Gazetteer of the Hissar District, by P. J. Fagan, 1892. Compiled and published under the authority of the Punjab Government. Lahore, 1893: size 9½ × 6½, pp. vi., 299, and xlii. *Presented by the Secretary of State for India.*

Madras Observations. **Smith.**

Results of Observations of the Fixed Stars made with the Meridian Circle at the Government Observatory, Madras, in the years 1877, 1878, and 1879, under the direction of the late Norman Robert Pogson, C.I.E., F.R.A.S. By C. Michie Smith, B.SC., etc. Vol. vi. Madras, 1893: size 11 × 9, pp. xxvii. and 350. *Presented by Mr. C. Michie Smith.*

Mongolia. *J. Asiatique*, 9, 1 (1893): 290–336. **Bretschneider.**

Itinéraires en Mongolie. Par M. E. Bretschneider, traduit du Russe par M. Paul Boyer.

This is a French translation of an article written by M. Bretschneider in December 1889 to serve as an introduction to the paper of the Archimandrite Palladius, published by the Russian Geographical Society.

Mount Sinai. *Imp. Asiat. Quarterly Rev.* **6** (1893): 149–158. **Sayce.**

Where was Mount Sinai? By Prof. A. H. Sayce.

Prof. Sayce is of opinion that the true Mount Sinai was situated on the borders of Midian and Edom among the ranges of Mount Seir, not in the Sinaitic Peninsula.

Palestine—Lebanon. **Post.**

Quarterly Statement, Palestine Exploration Fund, July, 1893, 219–239.

Narrative of an Expedition to Lebanon, Anti-Lebanon, and Damascus. By Rev. George E. Post, M.D.

Turfan. *Globus* **63** (1893): 381–386. **Hahn.**

Grum Grschimailos Forschungen in Turfan (Centralasien) Mitgeteilt von C. Hahn, Tiflis.

AFRICA.

African Names. *Rev. G.* **32** (1893): 450–456. **Sevin-Desplaces.**

L'Orthographie des Noms Africains. Par L. Sevin-Desplaces.

Calling attention to the inconsistencies in spelling African place-names, with special reference to French usage.

African Travels. **Colvile.**

Round the Black Man's Garden. By Zélie Colvile, F.R.G.S. With illustrations from drawings by the Author and from photographs. Edinburgh and London, William Blackwood & Sons, 1893: size 8½ × 6, pp. xvi. and 344. *Price* 16*s*. *Presented by the Author.*

Mrs. Colvile's journey described in this volume was in many respects an unusual one. With her husband, Colonel Colvile, she left Europe in September 1888 for a journey of seven months' duration, and embarking at Suez on an Egyptian steamer visited several of the Red Sea Ports, including Suakin, during its bombardment, Massawa, where she saw the solid results of Italian enterprise, Hodeida, and Aden. At Aden they took a French steamer to Tamatave, calling at East African ports. The most novel and interesting part of the journey was that across the Island of Madagascar through Antananarivo to Mojanga. Thence a French merchant took them across to Mozambique, where a coasting steamer was found for Durban. Through Natal by rail and the Transvaal by coach they ultimately reached Kimberley and Cape Town. Here a difficulty presented itself, as they wished to complete the tour of Africa by visiting the west-coast colonies, with which there was no direct communication. At length they decided to go to the Canaries, where a West-African coaster picked them up and enabled them to visit every place of importance on the Guinea Coast as far south as the mouth of the Gabun. Mrs. Colvile has described her observations with great literary skill, and produced a work of much higher merit than the average globe-trotter's diary.

African Volcanoes. *Deutsche G. Blätt.* **16** (1893): 105–127. **Meyer.**

Die Grossen Bruchspalten und Vulkane in Aequatorial Africa. Von Dr. Hans Meyer.

An attempt to give a general view of the part played by volcanic agencies in determining the configuration of the continent.

British East Africa. *Imp. Asiat. Quarterly Rev.* **6** (1893): 106–122. **Parry.**

The Capabilities of Eastern Ibea. By Francis Parry, F.R.G.S.

Cape of Good Hope—Statistics. ——

Statistical Register of the Colony of the Cape of Good Hope for the year 1892, with Supplement for March Quarter, 1893. Cape Town, 1893: size 13 × 8, pp. x. and 332, *diagram*. *Presented by the Colonial Secretary, Cape of Good Hope.*

Dahlak Island—Inscriptions. *J. Asiatique*, 9, **1** (1893): 77–111. **Basset.**

Les Inscriptions de l'Île de Dahlak, par M. René Basset.

The Dahlak Islands are situated in the Red Sea to the east of Massawa.

East Africa. *Petermanns M.* **39** (1893): 62–66, 82–85, 97–102. **Wagner.**

Die hypsometrischen und meteorologischen Ergebnisse der dritten ostafrikanischen Expedition von Dr. Hans Meyer im Jahre 1889. Von Dr. Ernst Wagner in Breslau.

East Africa. *Scottish G. Mag.* **9** (1893): 337–347. **Grant.**

The Anglo-Portuguese Delimitation Commission in East Africa. By Captain S. C. N. Grant, R.E.

German East Africa. *M. Forsch. Deutsch. Schutzgeb.* **6** (1893): 69–86. **Behr.**

Die Völker zwischen Rufizi und Rovuma. Von H. F. v. Behr.

Katanga. *B.S.R. Belge G.* **17** (1893): 105–163. **Du Fief.**

J. Du Fief. Les expéditions belges au Katanga. *With sketch map.*

Liberia. *Ausland* (1893): 348–350, 355–357. **Horn.**

Gegenwart und Zukunft der Negerrepublik Liberia. Von E. Horn.

Morocco. *Nautical Mag.* (1893): 593–608. **Broadbent.**
Morocco, The Straits, and France. By F. L. Broadbent.

Northern Africa—Lake Chad. *Rev. Française* **18** (1893): 12–16. **Demanche.**
La Route du Tchad et les prétentions Allemandes. Georges Demanche.

Senegal. *B.S.G. Com. Bordeaux* **16** (1893): 212–221, 225–248. **Rançon.**
Penetration au Soudan. Konkodougou et Sintedougou. Par le Dr. Rançon. *With map.*

NORTH AMERICA.

America—Discovery. *National G. Mag.* **5** (1893): 1–20. **Hubbard.**
Discoveries of America. Annual Address by the President, Hon. Gardiner G. Hubbard.

Fresh discussion of a well-worn theme, illustrated by reproductions of maps.

Mexico—Mt. Orizaba. *Science* **21** (1893): 253–257. **Scovell.**
Mount Orizaba, or Citlaltepetl. By J. T. Scovell. *With illustrations.*

United States—Colorado. **Chapin.**
The Land of the Cliff-dwellers. By Frederick H. Chapin. Boston, Appalachian Mountain Club, 1892: size 8 × 5½, pp. x. and 188. *With 67 illustrations. Presented by the Appalachian Club.*

A brief historical account of exploration in Colorado, and a more detailed description of the remains of the cliff-dwellers in the San Juan region, the Mancos, Acowitz, Cliff and Navajo cañons and the Mesa Verde. Most of the descriptions are from the author's personal observations.

United States—Cotton Growing. **Mell.**
Report on the Climatology of the Cotton Plant. By P. H. Mell, PH.D. (Bulletin No. 8, Weather Bureau, U.S. Department of Agriculture). Washington, 1893: size 9½ × 6, pp. 68. *Map and diagrams. Presented by the U.S. Weather Bureau.*

United States—Harbours. ———
Annual Report of the Chief of Engineers United States Army to the Secretary of War for the year 1892. In four parts with atlas. Washington, 1892: size 9½ × 6, pp. 3546 and index 24. Atlas 12 × 9½, 185 plates.

This comprehensive report gives full details of the engineering works carried out during 1892 on the various harbours and navigable rivers of the United States copiously illustrated by plans, sections and views.

United States—Minnesota. *Science* **21** (1893): 314–315. **Hall.**
The Formation and Deformation of Minnesota Lakes. By C. W. Hall, Minneapolis.

United States—Minnesota—Mammals. **Herrick.**
The Mammals of Minnesota. A Scientific and Popular Account of their Features and Habits. By C. L. Herrick. Minneapolis, Harrison & Smith, 1892: size 9½ × 6½, pp. 299. *Illustrations. Presented by the Geological and Natural History Survey of Minnesota.*

Forms Bulletin No. 7 of the Geological and Natural History Survey of Minnesota.

CENTRAL AND SOUTH AMERICA.

America, South. **Ford.**
Tropical America. By Isaac N. Ford. London, Edward Stanford, 1893: size 9 × 6, pp. xiv. and 410. *Illustrated. Price* 10*s.* 6*d. Presented by the Publisher.*

Mr. Ford describes Rio de Janeiro after the revolution of 1889, and then records his impressions on a journey which led him through Montevideo, Buenos Ayres, across the Andes, to the coast towns of the Pacific slope, then to the West Indies, and finally to Mexico. The observations throughout are from the standpoint of a citizen of the United States fully convinced of the sacredness of the Monroe Doctrine, and deploring the commercial supremacy of Europe in South America.

America, South. *Ann. G.* **2** (1893): 65–91, 365–398. **Gallois.**

Etat de nos connaissances sur l'Amerique du Sud. Par L. Gallois, professeur de Géographie, Lyon.

A summary of the advances in our knowledge of South America during the present century.

Ecuador. **Wolf.**

Geografia y Geologia del Ecuador. Publicada por orden del Supremo Gobierno de la Republica por Teodoro Wolf, Dr. Phil. Leipzig, Brockhaus, 1892: size 11 × 8, pp. xii. and 672. *Price with map in four sheets* 24*s.*

A copiously illustrated volume dealing in detail with the topography, geology meteorology, and biological distributions of Ecuador, with a chapter on the Galapagos Islands. It will be specially reviewed.

Haiti. **Rouzier.**

Dictionnaire géographique et administratif universel d'Haïti illustré. . . . ou Guide Général en Haïti. Par S. Rouzier. [Tome I., A.—F.]. Paris, C. Blot [1891]: size 10 × 6½, pp. xvi. and 393. *Maps and illustrations. Price* 15*s.*

This work, when completed, will form an important addition to our knowledge of a little-known part of the world.

AUSTRALASIA AND PACIFIC ISLANDS.

Australian Exploration. **Tietkins.**

Journal of the Central Australian Exploring Expedition, 1889, under the command of W. H. Tietkins. Adelaide, Bristow, 1891: size 8½ × 5½, pp. 84. *Map.*

Caroline Islands—Ponape. *B.S.G. Madrid* **34** (1893): 7–68. **Caberga.**

La Isla de Ponapé. Por el medico militar A. Caberga.

A geographical and ethnographical description of Ponape with a map of the island which is one of the 652 comprised in the Caroline Group of the Western Pacific.

New South Wales. *Records Geol. Survey, N.S.W.* **3** (1893): 80–85. **Etheridge.**

Ideographic Carvings of the Aborigines at Point Piper, Rose Bay, Port Jackson, &c. By R. Etheridge, junr. *With plate.*

New South Wales—Rainfall. **Russell.**

Results of Meteorological Observations made in New South Wales during 1890. Under the direction of H. C. Russell, B.A., C.M.G. Sydney, Potter, 1892: size 10 × 6½, pp. 140. *Map. Price* 3*s.* 6*d.*

Results of Rain, River, and Evaporation Observations made in New South Wales in 1891. Same director and publisher. Size 10 × 6½, pp. 152. *Map. Price* 3*s.* 6*d. Presented by the Agent-General for New South Wales.*

Pacific—Cocos Island. *Rev. de G.* **16** (1893): 349, 416; **17** (1893): 34–41. **Lièvre.**

D. Lièvre: Une ile déserte du Pacifique. L'ile des Cocos (Amérique). *With map and illustration.*

Philippine Islands—Negritos. *M. k.k. G. Ges. Wien.* **36** (1893): 329–331. **Blumentritt.**

Die Negritos am Oberlaufe des Rio Grande de Cagayan. Nach den Missionsberichten des P. Fray Buenaventura Campa. Von Professor Ferdinand Blumentritt.

Queensland Directory. **Pugh.**

Pugh's Almanac, and Queensland Directory, for 1893. Brisbane, Gordon and Gotch, 1893: size 7½ × 5, pp. xxxvi. and 194, 286, 328, *map and plan. Presented by the Under Colonial Secretary, Brisbane, Queenland.*

POLAR REGIONS.

Arctic Regions. *Goldthwaite's G. Mag.* 5 (1893): 165–169. **Schwatka.**

The Commerce of the Arctic Regions. By Lieut. Frederick Schwatka.

Spitzbergen. *Compt. Rend.* 117 (1893): 72–74. **Rabot.**

Sur les glaciers du Spitzberg. Note de M. Charles Rabot.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Atlantic. *B.S.G. Com. Bordeaux* (1893): 257–272. **Hautreux.**

A. Hautreux. L'Atlantique en 1892 et le climat de la Gironde. *With maps.*

Mountain-structure. *Petermanns M.* 39 (1893): 136–141. **Rudzki.**

Eine Betrachtung über die Kontraktions theorie der Gebirgsbildung und die Beschaffenheit des Erdinnern. Von M. P. Rudzki.

GENERAL.

Biographical Dictionary. **Lee.**

Dictionary of National Biography. Edited by Sidney Lee. Vol. xxxv. MacCarwell—Maltby. London, Smith, Elder & Co., 1893: size 10 × 7, pp. vi. and 447. *Price* 15*s.*

The following names more or less connected with geography and travel appear among the notices in the present volume:—John McCluer, by Prof. J. K. Laughton; Sir Robert John le Mesurier McClure, by the same; Robert McCormick, by the same; Sir Richard Graves Macdonnell, by G. C. Boase; Sir Charles Metcalfe Macgregor, by Capt. S. P. Oliver; John Macgregor, by J. M. Rigg; John Macgregor (Rob Roy), by C. A. Harris; Alexander Murdoch Mackay, by A. H. Millar; Sir Alexander Mackenzie, by H. M. Chichester; Charles Frederick Mackenzie, by the Rev. W. Hunt; Colin Mackenzie, by H. M. Chichester; John McKinlay, by C. A. Harris; Angus Macmillan, by the same; William Watts McNair, by W. A. J. Archbold; James Macqueen, by G. Goodwin; and Richard Henry Major, by E. J. L. Scott.

Languages. **Vasconcellos.**

Sur le Dialecte Portugais de Macao. Exposé d'une mémoire destinée à la 10e Session du Congrès international des Orientalistes. Par J. Leite de Vasconcellos. Lisbonne, Société de Géographie, 1892. *Presented by the Geographical Society of Lisbon.*

Some indications concerning the geographical distribution of Portuguese dialects in Europe, America, Africa, and Asia.

Map Reading. **Verner.**

Map Reading and the Elements of Field Sketching. By Major Willoughby Verner. London, R. H. Porter, Simpkin, & Co., 1893: size 7½ × 5, pp. 62. *Illustrations. Price* 2*s.* 6*d.*

Races. **Fortescue.**

The Influence of Climate on Race. By the Hon. John W. Fortescue. Size 10 × 6½, pp. 12. *From the 'Nineteenth Century,' May*, 1893.

Voyages—Columbus, &c. **Markham.**

The Journal of Christopher Columbus (during his first voyage, 1492–93) and Documents relating to the Voyages of John Cabot and Gaspar Corte Real. Translated, with Notes and an Introduction, by Clements R. Markham, C.B., F.R.S. London, The Hakluyt Society, 1893: size 9 × 6, pp. liv. and 260. *Presented by the Hakluyt Society.*

The eighty-sixth volume of the Hakluyt Society's publications, like the second and the forty-third, is mainly devoted to the writings of Columbus, and now the Society has published translations of everything which survives of the great navigator's writings. In this instance the journal of the first voyage is very ably connected with the immediate results of that voyage—the explorations of Cabot and Corte Real. Mr. Markham has annotated the whole, making clear many points formerly obscure.

NEW MAPS.

By J. COLES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Ordnance Survey.**

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ENGLAND AND WALES: **Blackburn** (Lancashire), LXII. **16**, 3, 4, 8*s.* each; 5, 3*s.*; 8, 9, 8*s.* each; 10, 5*s.*; 13, 11*s.* 6*d.*; 14, 8*s.*; 15, 5*s.*; 18, 11*s.* 6*d.*; 20, 3*s.*; 24, 5*s.*; 25, 3*s.*; 8, 5*s.*. **Sheffield** (Yorkshire), CCXCIV. **2**, 25, 4*s.*; CCXCIV. **3**, 7, 5*s.*; 12, 4*s.*; CCXCIV. **4**, 3, 5*s.*; 5, 5*s.*; 7, 5*s.*; 8, 4*s.*; 9, 4*s.*; 10, 5*s.*; 11, 4*s.*; 13, 5*s.*; 15, 5*s.*; 20, 5*s.*; CCXCIV. **6**, 24, 4*s.*; 25, 5*s.*: CCXCIV. **7**, 6, 4*s.*; CCXCIV. **8**, 10, 5*s.*; 14, 4*s.*; CCXCIV. **10**, 9, 5*s.*; 15, 4*s.*; CCXCIV. **11**, 6, 5*s.*; 11, 4*s.*; 17, 5*s.*; 18, 5*s.*; 22, 5*s.*; 23, 5*s.*; CCXCIV. **12**, 8, 4*s.*; CCXCIV. **15**, 2, 5*s.*; 7, 4*s.*; 8, 5*s.*; 13, 5*s.*; 14, 5*s.*; 15, 5*s.*; CCXCIV. **16**, 2, 5*s.*; 11, 5*s.*; 12, 4*s.*; CCXCV. **1**, 2, 5*s.*; 3, 5*s.*, additional sheets. **Withington** (Lancashire), CXI. **1**, 19, 5*s.*; 24, 5*s.*; 25, 5*s.*; CXI. **2**, 1, 4*s.*; 2, 5*s.*; 3, 5*s.*; 8, 5*s.*; 13, 3*s.*; 16, 2*s.* 6*d.* (coloured).

(*E. Stanford, Agent.*)

Germany. **Königl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Scale 1 : 100,000, or 1·3 geographical mile to an inch. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1893. Sheets:—66, Rügenwalde; 79*a*, Helgoland; 108, Spiekeroog; 109, Wangeroog; 657, Waldshut; 669, Oltingen. *Price* 1·50 *marks each sheet.* (*Dulau.*)

Greece. **Curtius and Kaupert.**

Karten von Attika, Auf Veranlassung des Kaiserlich Deutschen Archäologischen Instituts, und mit Unterstützung des Königlich Preussischen Ministeriums der Geistlichen, Unterrichts- und Medicinal-Angelegenheiten, Aufgenommen durch Offiziere und Beamte des K. Preussischen Grossen Generalstabes. Mit erläuterndem Text herausgegeben von E. Curtius und J. A. Kaupert. Heft. vii. Bl. xx. Tatoi; Bl. xxi. Salamis. Maasstab 1:25,000, or 2·5 inches to a statute mile. Dietrich Reimer (Inhaber, Hoefer & Vohsen), Berlin, 1893.

Lakes Districts of British Isles. **Johnston.**

Map of the Lake District of England. Scale 1:284,700, or 3·9 geographical miles to an inch. Map of the Lake District of Scotland. Scale 1: 380,160, or 6 statute miles to an inch. Map of the Lake District of Ireland. Scale 1:94,900, or 1·5 statute mile to an inch. W. & A. K. Johnston, Edinburgh and London. *Price* 1*s. each. Presented by the Publishers.*

These maps fold into a handy size for carrying in the pocket, and so far as that is concerned are suitable for tourists. In other respects, however, they are not so satisfactory as they might be, either as regards clearness of drawing or the amount of information they contain.

AFRICA.

East Africa. **Höhnel.**

Provisorische Original-Karte der Expedition Wm. Astor Chanler's vom Tana-Fluss zum Guasso-Njiro. Aufgenommen u. gezeichnet von L. R. v. Höhnel. K. u. K. Linienschiffslieutenant. Scale 1:500,000, or 7·8 statute miles to an inch. *Petermann's Geographische Mitteilungen.* Jahrgang, 1893. Tafel 9. *Presented by the Publisher.*

Kilimanjaro. **Hassenstein.**

Spezialkarte des Kilima-Ndscharo- und Meru-Gebietes. Nach Breitenbestimmungen, Routenaufnahmen, Winkelmessungen, &c., von Dr. Hans Meyer, Lieut. L. v. Höhnel, Dr. Oscar Baumann u. A., bearbeitet und gezeichnet von Dr. B. Hassenstein. Scale 1:350,000, or 4·7 geographical miles to an inch. *Petermanns Geographische Mitteilungen.* Jahrgang, 1893. Tafel 7. Gotha, Justus Perthes, 1893. *Presented by the Publisher.*

AMERICA.

British Columbia. **Brownlee.**

Map of the Province of British Columbia. Compiled by J. H. Brownlee, D.L.S., from the latest maps and surveys and all reliable sources of information to date. By direction of the Honourable F. G. Vernon, Chief Commissioner of Lands and Works. Victoria, 1893. Scale 1:2,070,000, or 32·5 statute miles to an inch. (*Stanford*).

This map shows all the divisions of British Columbia, and contains more detail than any previously published map of that Province. It is produced in a very rough style, the railways being drawn in much the same style as is usually seen on the maps in time-tables; the hill-shading also is anything but satisfactory. A departure has been taken in the position assigned to the boundary between Alaska and British Columbia, in the neighbourhood of Revilla Gigedo Island, by which some of the islands and mainland, which on all previous maps have been shown as part of Alaska, are taken into British Columbia. As this is a point in dispute at the present time, it would have been better to have indicated the boundary as uncertain, instead of marking it with a hard line on insufficient authority, and care should have been the more especially taken in this respect as the map is a Government publication. Considering the amount of survey work that has been done in this Province since 1857, it would not be unreasonable to have expected a much better map both as regards details and the style of production.

California. **Sierra Club, San Francisco.**

Map of a portion of the Sierra Nevada, adjacent to the Yosemite and Hetch Hetchy Valleys. Scale 1:253,310, or 3·47 geographical miles to an inch. J. N. Le Conte, 1893. Map of a portion of the Sierra Nevada adjacent to the King's River. Scale 1:253,310, or 3·47 geographical miles to an inch. J. N. Le Conte, 1893. Compiled for the Sierra Club, San Francisco, California. *Presented by the Sierra Club.*

These two maps, which embrace the southern portion of the Sierra Nevada, have

been compiled for the Sierra Club, an institution which has been formed for the purpose of exploring and rendering accessible the mountain regions of the Pacific coast, and also to enlist the support and co-operation of the people and the government in preserving the forests of the Sierra Nevada. The maps are outline sketches on which the positions of mountains are shown; but the heights are only given in a few instances. No doubt these may be regarded as preliminary sketch-maps, and that future editions will contain more detailed information.

Mt. St. Elias. **U.S. Coast and Geodetic Survey.**

Skizze der Mt. St. Elias Regione Alaska. Zur Uebersicht der vom U.S. Coast and Geodetic Survey ausgefuehrten Messungen im Jahre, 1892. Scale 1:1200,000, or 18·7 statute miles to an inch. *Petermann's Geographische Mitteilungen*, 1893, seit 142. Justus Perthes: Gotha. *Presented by the Publisher.*

GENERAL.

German Colonies. **Langhans.**

Deutscher Kolonial-Atlas. 30 Karten mit vielen Hundert Nebenkarten, entworfen, bearbeitet und herausgegeben von Paul Langhans. Vierte Lieferung. Inhalt: Nr. 28, Schutzgebiet der Neu-Guinea-Kompanie, Blatt 5. Nr. 30, Schutzgebiet der Marshall-Inseln. Gotha: Justus Perthes, 1893. *Price* 1 *mark* 60 *pf.*

Sheet No. 28 contains the south-eastern extremity of New Guinea and the neighbouring islands with numerous insets. Sheet No. 30 is a map of the Marshall Islands, with enlarged plans of the separate islands as insets.

The World. **Johnston.**

W. & A. K. Johnston's Royal Atlas of Modern Geography. Edition in monthly parts. Parts 20 and 21. W. & A. K. Johnston, Edinburgh and London. *Price* 4*s.* 6*d each. Presented by the Publishers.*

Part 20. Sheet 17 is the central sheet of a map of the Dominion of Canada, with insets of Niagara, Montreal, and Quebec. Sheet 22 is a map of Turkey in Europe, with Rumania, Servia, Montenegro, and Bulgaria, with insets of the Bosphorus, and Constantinople, and the Island of Crete. Part 21 contains a map of Spain and Portugal, with insets of the Canary Islands, Madeira, Lisbon, and Madrid; and the eastern sheet of a map of the Dominion of Canada comprising New Brunswick, Nova Scotia, Prince Edward Island, Cape Breton Island, and Newfoundland. This excellent atlas is now approaching completion, and only seven parts remain to be published. The maps, which are very nicely drawn and brought up to date, are each accompanied by an index.

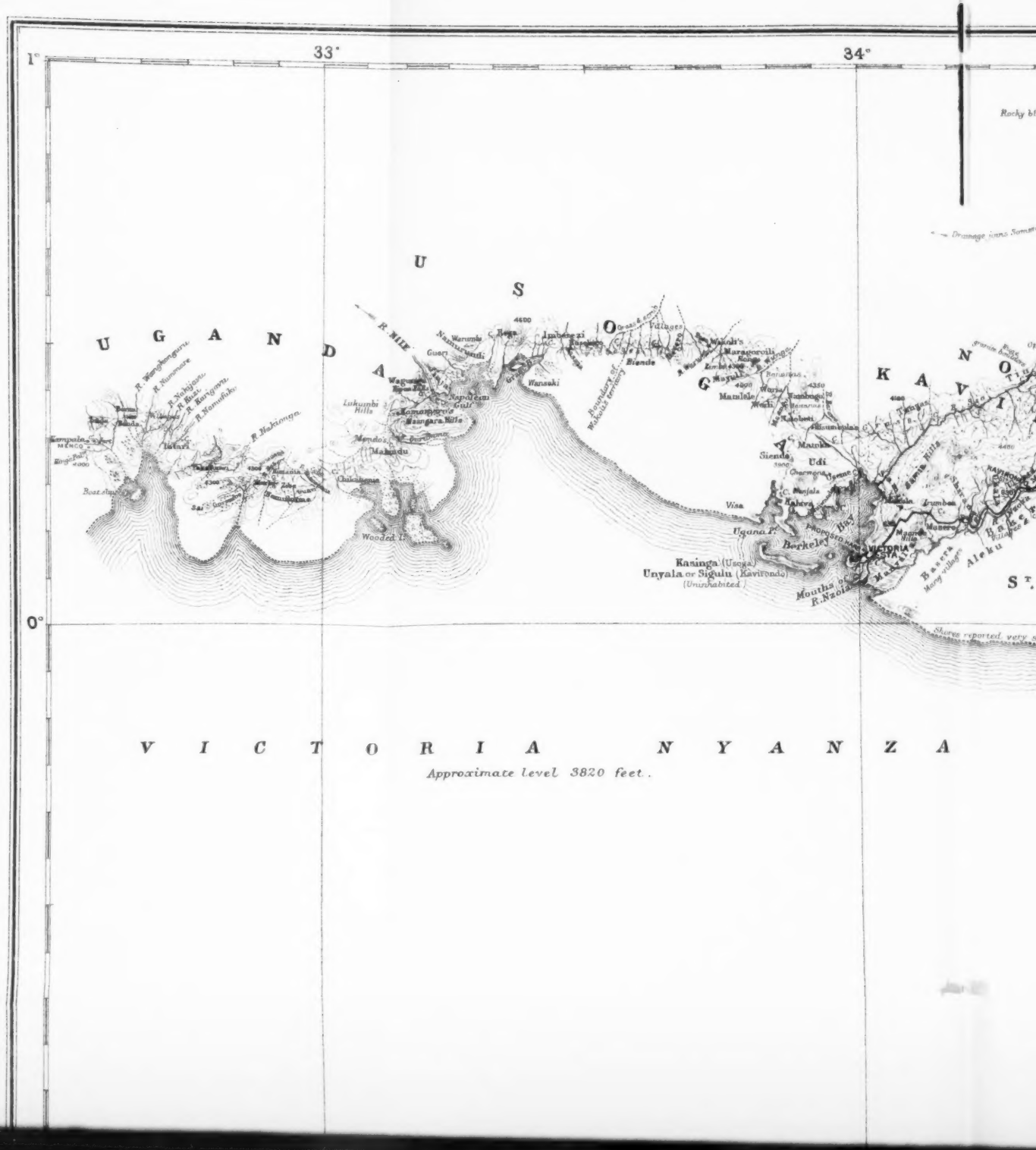
The World. **Vidal-Lablache.**

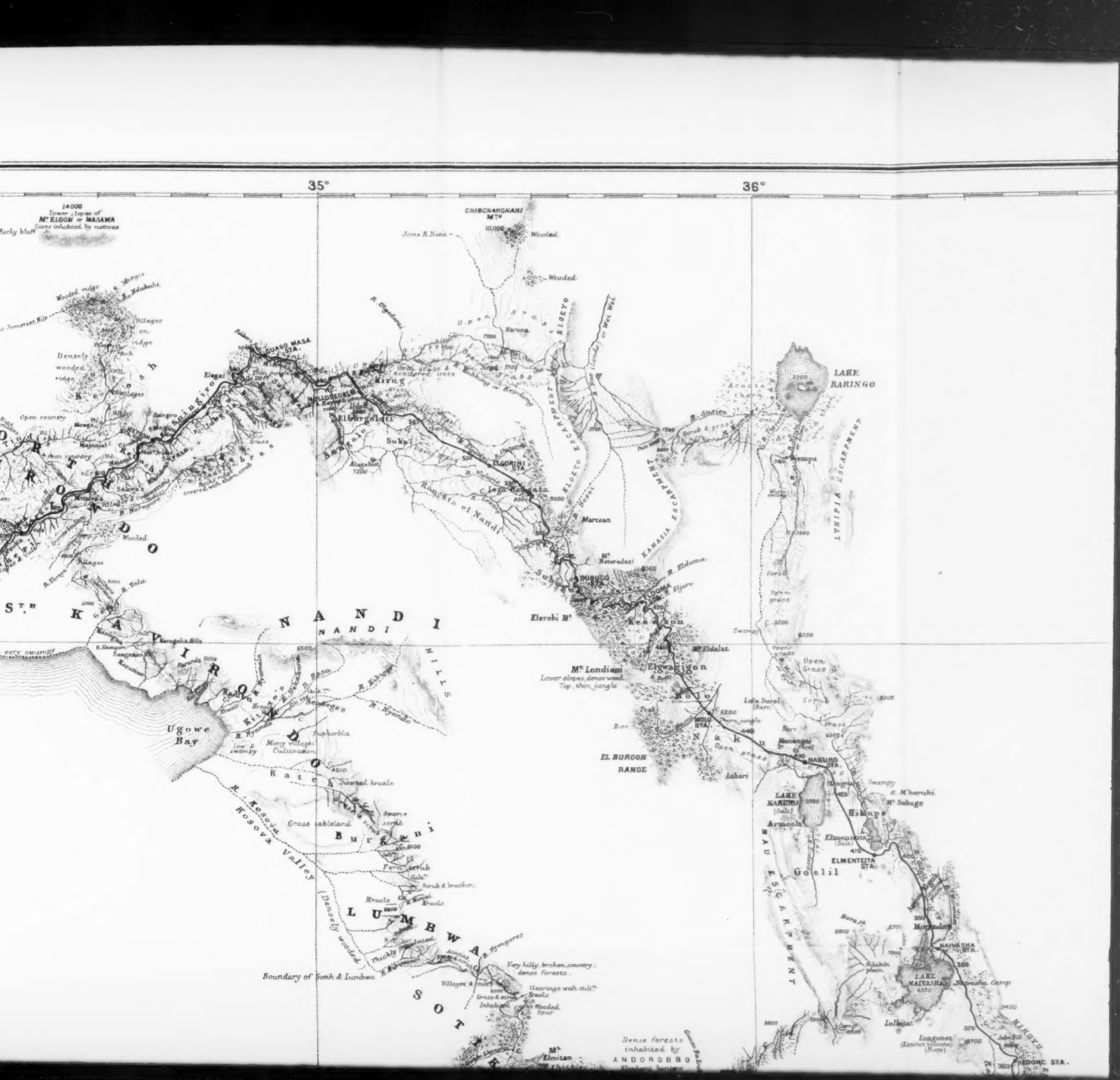
Atlas Vidal-Lablache, Maitre de Conférences de Géographie a l'École Normale Supérieure, Histoire et Géographie, 137 Cartes, 248 Cartons. Index alphabétique de plus de 40,000 noms. (L'Atlas complet paraîtra en 24 livraisons). 20e Livraison. Paris, Armand Colin & Cie., Éditeurs. *Price* 1 *fr.* 25 *c.*

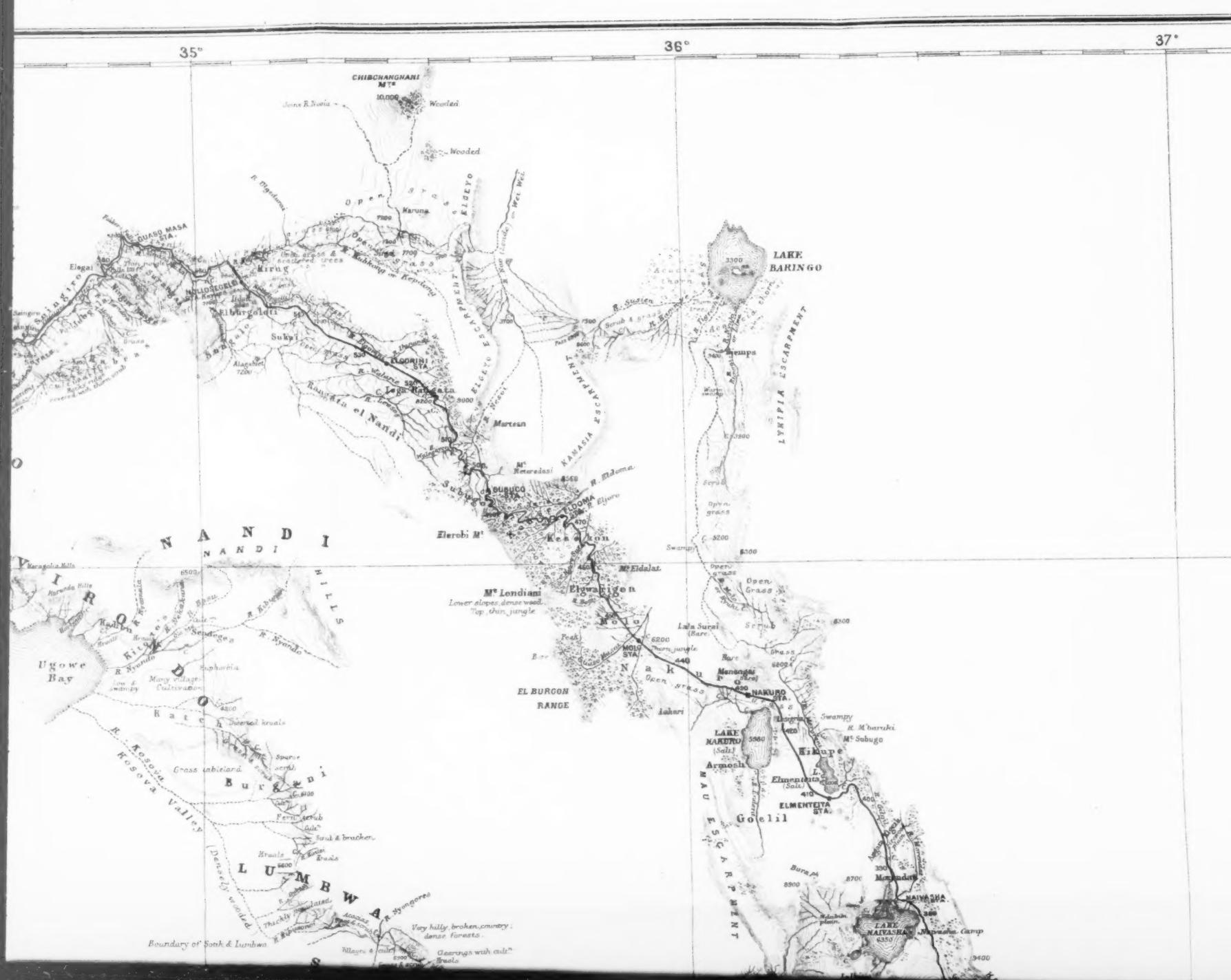
Sheets 108a, 108b, and 108c, together form a map of Great Britain and the neighbouring coasts of France and Belgium, orographically coloured, with a small inset map showing the positions and extent of the British Colonies. Sheet 108d is a map of Ireland drawn on the same scale and coloured in the same manner as the map of Great Britain. Sheet 117 contains maps showing products, industries, and races of Asia. Sheet 119 is a political map of Asia, with insets showing its principal physical features, the area which has been surveyed, and the principal explorations. Sheet 120 is a map of Western Asia. Each of the maps is accompanied by notes.

PHOTOGRAPHS.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.


1°
33°
34°
0°
U G A N D A
U S O G A
K A V I R O N D O
V I C T O R I A N Y A N Z A
R. Mile
Wanaski
Napoleon Gulf
Mamonjorwe
Maungara Hills
Lukumbi Hills
Mandoa
Makandu
Chickamoan
Wooded I.
Boat station
Kampala
MENGO
Entebbe
Bukasa
Sese
Bumbire I.
Kome I.
Ukerewe I.
Kagehi
Kisumu
Maseno
Mumias
Kavirondo Gulf
Kaninga (Usoga)
Unyala or Sigulu (Kavirondo)
(Uninhabited)
Mouths of R. Nzoia
Berkeley Bay
Uganda P.
Promontory
Visa
Kahva
Sienda
Udi
Maimbi
Mumbia
Mageta I.
Rusinga I.
Aleku
Basera
Mawego
Approximate level 3820 feet.

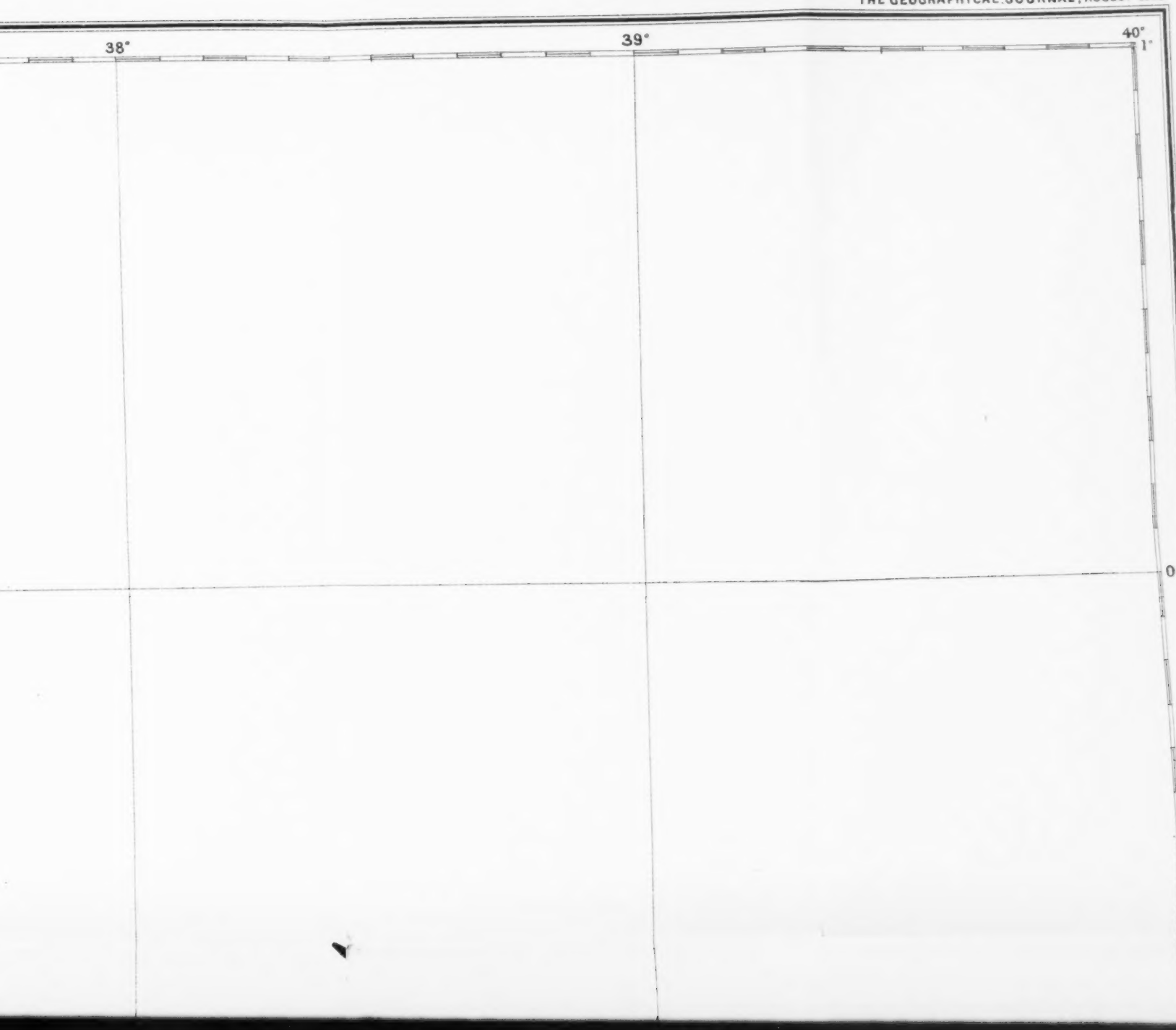

35°
36°
Mt ELGON or MASAWA
Caves inhabited by natives
Rocky bluff
Summit Rib
Wooded ridge
R. Morges
R. Bdabelki
Villages on ridge
Densely wooded ridge
Open country
Saingro
Majanjas
Sakwa's
R. Nzoia
R. Yala
Wooded.
Villages
Kabras
Kisumu
Kavirondo
Ugowe Bay
Kavirondo Hills
Nandi
Nandi Hills
Kamasia Escarpment
Elgeyo Escarpment
Lumbwa
Sotik
Boundary of Sotik & Lumbwa
Very hilly, broken country; dense forests.
Dense forests inhabited by ANDOROBBO
Elgeyo
Kerio
Kamasia
Lyhpia Escarpment
Chibonanongani Mt
Wooded
Karuna
Kipkaren
Kipkeloi
Kipsigis
Kisii
Kericho
Elgeyo Escarpment
Mt Londiani
Lower slopes dense wood. Top, thin jungle
Elgon
Elgeyo
Marakwet
Kamasia
Tugen
Elgeyo Escarpment
Mt Eldalat
Mt Elgon
Mt Kenia
Mt Kipipiri
Mt Longonot
Mt Suswa
Mt Mau
Mt Subugo
Mt Elmitan
Mt Meneges
Mt Nereidesi
Mt Kipipiri
Mt Longonot
Mt Suswa
Mt Mau
Mt Subugo
Mt Elmitan
Mt Meneges
Mt Nereidesi
Mt Eldalat
Mt Londiani
Mt Elgon
Mt Kenia

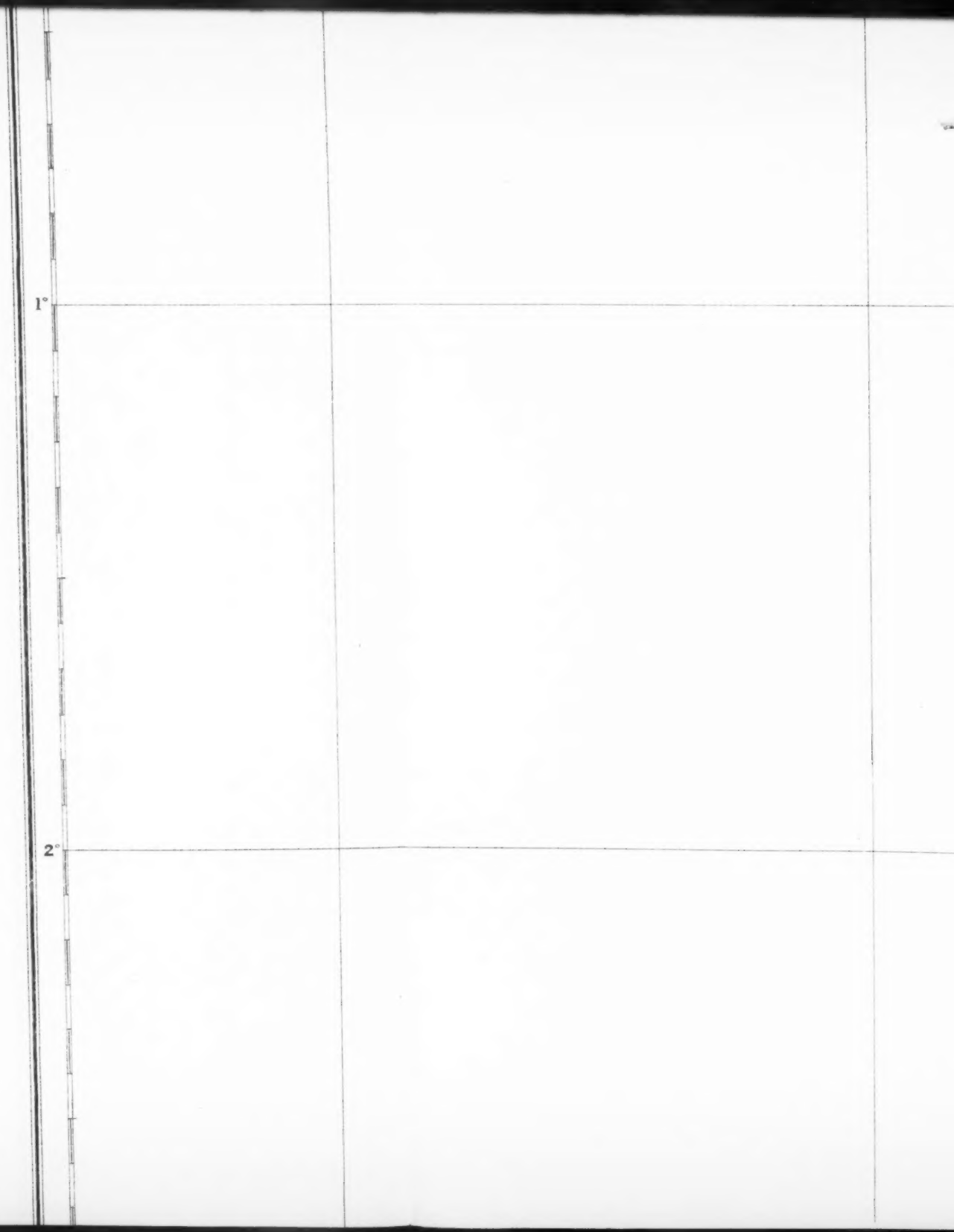

35°
36°
37°
CHIBCHANGHANI Mt.
10,000
Wooded
Open Grass
Karuna
LAKE BARINGO
3300
Elegai
Kirug
Elburgeldi
Sukpi
Lega Rangata
Marsan
Mt. Meteredesi
Subukia
Elerobi Mt.
Kabarnet
Mt. Eldalat
Mt. Londiani
Lower slopes dense wood. Top, thin jungle
Elgwarigen
Molo
Lala Surai (Bare)
Thorn jungle
Open Grass
Scrub
Grass
Bare
Menengai
NAKURO STA.
Nakuru
Lakari
EL BURGON RANGE
LAKE NAKURU
(Salt)
5960
Armosh
Kikupe
Mt. Subugo
Elmenteita
(Salt)
ELMENTEITA STA.
Goelil
Mau Escarpment
Mau Summit
Naivasha
LAKE NAIVASHA
6350
Naivasha Camp
Lumbwa
Densely wooded
Grass with bush
Very hilly, broken country; dense forests
Boundary of Sotik & Lumbwa
Kisumu
Ugowe Bay
Kano Plains
Grass lakeland
Burgeni
Kosova Valley
Thicket
Scrub & bracken
Euphorbia
Many village Cultivation
Swampy
Sparse scrub
Thorn & scrub
Thick bush
Trees & scrub
Trees & bush
Trees & grass
Thin grass & scattered trees
Thin grass & bush
Thin grass & trees
Thin grass & thorn trees
Thin grass & thorn bush
Thin grass & scrub
Thin grass & Acacia
Thin grass & Euphorbia
Thin grass & Aloes
Thin grass & Cactus
Thin grass & Sansevieria
Thin grass & Aloe

38°

39°

36°
37°
CHIBCHANGNANI Mt°
10,000
Wooded
Wooded
Open Grass
Karuna
7200
ELGEYO
Open Grass
7300
7100
7700
R. Kabkwa or Kerpdony
Grass
ELGEYO ESCARPMENT
R. Susien
Scrub & grass
R. Kamnai
7300
3700
8600
LAKE BARINGO
5300
Acacia thorn
R. Ngambo
Acacia thorn
Temps
7400
LYKIPIA ESCARPMENT
ELDORINI STA.
R. Thogondo
R. Molo
R. Nzoia
Lega Ranet
8200
9000
el Nandi
Marteun
R. Nzoia
KAMASIA ESCARPMENT
Mt Neteredesi
R. Eldoma
SUBUKO
BUBUCO STA.
R. Eldoma
ELDOMA STA.
R. Elgoro
Elerobi Mt
Reed Soil
Mt Eldalat
Elgwarigon
Mt Londiani
Lower slopes dense wood
Top thin jungle
Lala Surai
(Rare)
Thorn jungle
MOLO STA.
Rare
Grass
Mangosas
(Rare)
NAKURO STA.
EL BURGON RANGE
Lahari
Open grass
LAKE NAKURO
(Salt)
5580
Swampy
R. M'barsoki
Mt Subugo
KiHepe
Armosh
Elmenteita
(Salt)
ELMENTEITA STA.
Goelil
MAU ESCARPMENT
Burnt pk
8800
8701
Mau Summit
NAIVASHA STA.
LAKE NAIVASHA
6350
Very hilly broken country; dense forests
Clearings with cult.
Grass & scrub
Trails


38°
39°
40°
1°
0°


1°
2°

Goelil
Escarpment
Bura pk
Mayudas
NAIVASHA
LAKE NAIVASHA
Mayudas Camp
Lolbisat
Longonot
(Extinct volcano)
(Bare)
KEDONG
Kedong Valley
Elmitan Camp
SUSWA
(Extinct Volcano)
(Bare)
R. Kedong
Donyo Lamuyo
LUMBWA
SOTIK
Boundary of Sotik & Lumbwa
Densely wooded
Fern & scrub
Scrub & bracken
Kraals
Thickly populated
R. Kipsonoi
R. Syongores
Very hilly broken country; dense forests.
Villages & cult.
Clearings with cult.
Grass & acres
Inhabited
Wooded Spur
Mt. Elmitan
Thickly wooded
Dense forests inhabited by ANDOROBBO Elephant hunters
Guasa Nyiro
Dense forest
Open grass
Guasa Nyiro
Old Masai Kraals
Uninhabited
Patches of forest and grass
Wooded low saddle
Wooded heights
Wooded range
Line of higher ridge
Cluster of low bare hills
R. Nyiro
Guasa Narok
Guasa Sisimi
Occasionally occupied by Masai
Grass
Grass
Grass
Grass
Lake Bill
Camp
Camp
6800
6900
6700
6350
6400
6600
6800
6700
6800
7000
7400
7100
7100
5800
6300
6300
6800
6800
6800

Goelil
ELMENTEITA STA.
ESCARPMENT
Mozandati
NAIVASHA STA.
LAKE NAIVASHA
Naivasha Camp
Lolbutat
Longonot
(Extinct volcano)
(Bare)
KEDONG STA.
Kedong Valley
Kedong Camp
ESCARPMENT STA.
SUSWA
(Extinct Volcano)
(Bare)
Kijabi
Many villages
Kijabi Peak
Ngongo Bagas
Donyo Lamuyu
7300
R. Kedong
Thickly populated
Very hilly broken country
dense forests
Boundary of Sotik & Lumbwa
LUMBWA
SOTIK
Densely wooded
Dense forests
inhabited by
ANDOROBBO
Elephant hunters
Thickly wooded
Uninhabited
Patches of forest and grass
Wooded range
Wooded heights
Cluster of low bare hills
Line of higher ridge
Old Masai trail
Masai
Grass
Dense forest
Open grass
Crest
Ridge
Saddle
Low saddle
Camp
Village
Trail
Track
Road
Bridge
Ford
Pass
Peak
Hill
Plain
Escarpment
Scrub & bracken
Kraals
Cultivation
Gearings with cult.
Wooded Spur
Grassy Nala
Gusaro Na Erok
Gusaro Nyiro
Gusaro Sambu
Gusaro Mbwa
Gusaro Nyuki
Gusaro Nyuki occupied by MASAI
R. Nyiro
Mt. Elmitan
7000
Bura Ph
8300
8700
8800
9400
9700
8600
8500
7200
6900
6600
6400
6300
6100
6000
5800
5500
5300
5000
4800
4600
4400
4200
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
390
380
370
360
350
340
330
320
310
Fo

ATHI PARK STA.
ATHI PLAINS STA.
ATHI PLAINS STA.
ATHI MACHAKO'S STA.
MACHAKOS
ATHI KEITE STA.
KIU STA.
KIU
KEMALI STA.
SALT RIVER STA.
KIBOKO STA.
KIBWEZI STA.
ATHI KIBWEZI STA.
ANDEI STA.
ATHI ANDEI STA.
MASAI GRAZING GROUNDS
Athi Plains
Kapiti Plain
Open grass plain
Open grass
Open bush
Hilly country
Rough grass, numerous small swamps
Bare hills with wooded heights
Densely wooded
Thick bush
Thorn bush
Scrub
Grass with scattered trees
Dense bush
Open thorn bush
Bare knolls
Bare peak
Uninhabited
Kiu Hills
Kemali Hills
Mua Hills
Mbooni Hills
Yatta
Nzaui Hills
Kibwezi (Mission)
Nzaui
Masai
Ongolea Mts.
Athi R.
Kibwezi R.
Kiboko R.
Kenia R.
Machakos
Villages & cultivation
Scattered bush & cultivation
Dense bush with open glades
Grass & thin bush
Rocky ridge
Grass & scattered bush
Bush with open patches
Bush open
Dense bush
Open thorn scrub
Densely wooded
Peaches of open grass
Villages & cultivation
Scattered scrub
Open thin bush
Thick bush
Dense jungle
Waterholes
Thorn bush
Dense bush
Open
Bare
Bare hills
Bare rocky hill
Swamp
Waterholes
Kenia Pk
Kiu Hills
Mua Hills
Mbooni Hill
Kalembwal
Kemali Hills
Nzaui Hills
Kibwezi (Mission)
Ulu Kenia Hills
Bandani Camps
Jorge Sabuk or Chianjuma
Kenia R.
Athi R.
Machakos
Kiboko R.
Kibwezi R.
Kenia R.
Mbooni R.
Kiu
Kapiti
Plain
Masai
Ongolea Mts.
Nzaui
Yatta
Andei
Ngaranga Rocks
Waterholes
Thorn bush
Dense jungle
Open thin bush
Thick bush
Scrub
Grass
Pool
Stony desert country
Dense bush
Open
Bare
Bare hills
Swamp
Waterholes
Thorn bush
Thick bush
Dense bush
Open
Densely wooded
Thick bush
Dense bush
Scattered scrub
Open thin bush
Dense jungle
Thorn bush
Scrub
Grass
Pool
Stony desert country
Dense bush
Thorn

Armosh
Elmentaita (Salt)
ELMENTEITA STA.
Goelil
MAU ESCARPMENT
NAIVASHA STA.
LAKE NAIVASHA
6350
Naivasha Camp
Lolbitat
Longonot (Extinct volcano) (Bare)
KIKUYU ESCARPMENT
KEDONG STA.
ESCARPMENT STA.
Kedong Valley
Kedong Camp
SUSWA (Extinct Volcano) (Bare)
Mt. Elmitan
ANDOROBBO
Elephant hunters
Dense forest inhabited by
Thickly wooded
Uninhabited
Patches of forest and grass
Wooded range
Line of higher ridge
Cluster of low bare hills
R. Nzoia
R. Kedong
Thickly populated
Wandenge
Hararu
Many villages
KIJABE STA.
Ngumbu Buttes
Donyo Lamuyu 7300
MASAI GRAZING GROUNDS
Athi Plains
ATHI PLAINS STA.
Ulu
Kena Hills
Donyo Sabuk
Chiamjani
ATHI PARK STA.
Open grass plain
Kena R.
ATHI MACHAKO'S STA.
MACHAKO'S
Machakos Villages
Scattered bush & cultivation
Hilly country
Dense bush with open glades
ATHI KEITE STA.
KIU STA.
Kiu Hills
Kapiti Plain
Rough grass, numerous small swamps
Open bush country
Kenali Hills
KENALI STA.
Bare peak
High rocky hill
Bare hills
KIBOKO
Grass with scattered trees
R. Kiboko
R. Athi
Bare hills with wooded heights
Patches of open grass
NIBWEZI STA.
Villages & cultivation
Densely wooded
ONGOLEA Mts.

1°
2°
SALT RIVER STA.
Yatta
Densely wooded
KATHI KIBWEZI STA.
Thick bush
Kibwezi
Mission
KIBWEZI STA.
Scattered scrub
Open thin bush
Scrub
Grass
Acacia Thorn bush
Dense jungle
Waterholes
KATHI ANDEI STA.
Thick bush
Stony difficult country
ANDEI STA.
Thin bush
Dense bush
Open
Bush
Thorn scrub
Kibwezi Hills
Villages
Villages cultivation
Densely wooded
Kamunyo
Kyoko
Ngamuya
Pool
Ivisi R.
Kasha R.
Kibwezi R.
Andei R.

MOMBASA - VICT

PROJECTED RA

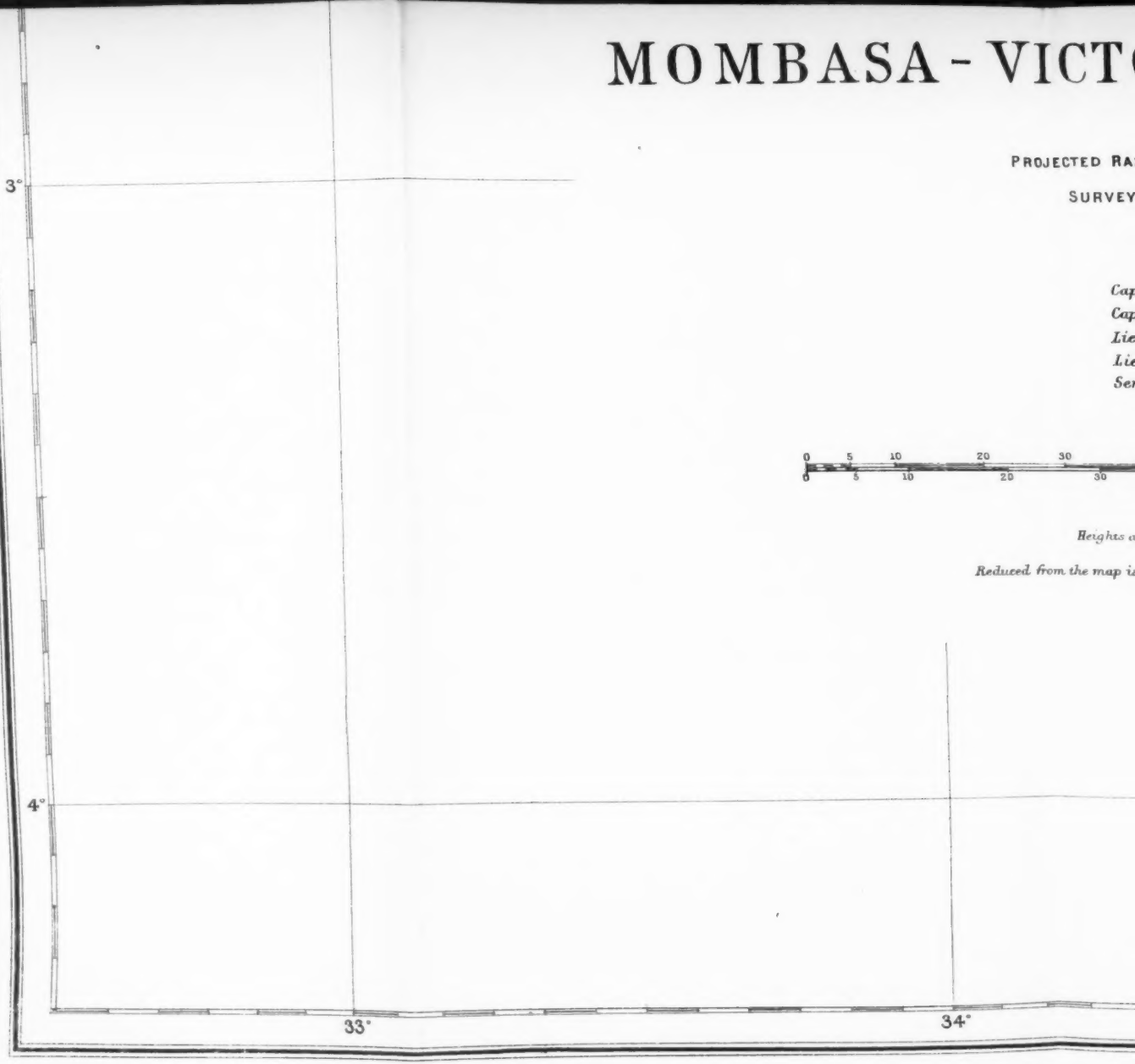
SURVEY

Cap
Cap
Lie
Lie
Ser

0 5 10 20 30
0 5 10 20 30

Heights a

Reduced from the map is



TORIA LAKE RAILWAY.

D RAILWAY ROUTE — STATION — 10 Statute Miles from Mombasa

RVEYED ROUTES ..... C. = Camp

Surveyed in 1892
by
Captain J.R.L.Macdonald, R.E.
Captain J.W.Pringle, R.E.
Lieut. P.G.Twining, R.E.
Lieut. H.H.Austin, R.E.
Sergt F.H.Thomas, M.W.D., India.

Statute Miles.
40 50 60 70 80 90 100
30 40 50 60 70 80 90
Geographical Miles.

NATURAL SCALE – 1/1,000,000.

ghts above the Sea level expressed in feet, thus, 4570.

map issued by the Intelligence Division, War Office, 1893.

35° Longitude East from Greenwich. 36°

Published by the Royal Geographical Society.

VICTORIA LAKE RAILWAY.

PROJECTED RAILWAY ROUTE — STATION — 10 Statute Miles from Mombasa

SURVEYED ROUTES ..... C. Camp

Surveyed in 1892
by
Captain J.R.L.Macdonald, R.E.
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Lieut. P.G.Twining, R.E.
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Sergt F.H.Thomas, M.W.D., India.

Statute Miles.
20 30 40 50 60 70 80 90 100
20 30 40 50 60 70 80 90
Geographical Miles.

NATURAL SCALE - 1/1,000,000.

Heights above the Sea level expressed in feet, thus, 4570.

Reduced from the map issued by the Intelligence Division, War Office, 1893.

35° Longitude East from Greenwich. 36°

Published by the Royal Geographical Society.

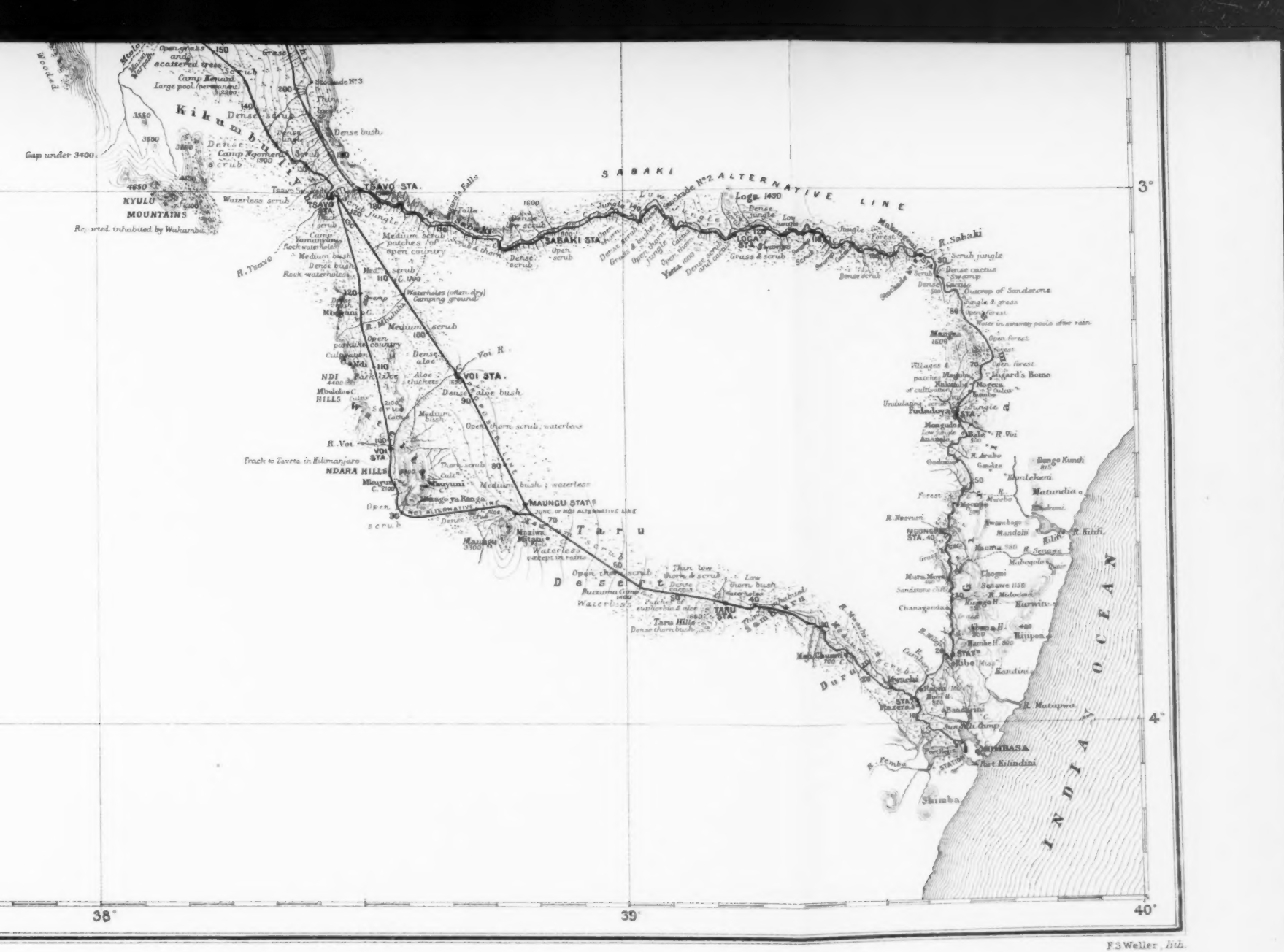
Open grass and scattered trees
Camp Kenani
Large pool (permanent)
Kikumbuliyu
Dense scrub
Dense bush
Gap under 3400
Camp Ngomeni
Scrub
KYULU MOUNTAINS
Rugged, inhabited by Wakamba
Waterless scrub
TSAVO STA.
Tsavo R.
Camp
Yamungome
Rock waterholes
Medium bush
Dense bush
Rock waterholes
Medium scrub
Waterholes (often dry)
Camping ground
Mbooni
Medium scrub
Open pasture country
Cultivation
Dense aloe
Voi R.
NDI
Aloe thickets
VOI STA.
Dense aloe bush
Mbololo HILLS
Open thorn scrub, waterless
R. Voi
VOI STA.
Track to Taveta in Kilimanjaro
NDARA HILLS
Thorn scrub
Cultivation
Miuyuni
Medium bush; waterless
Mwango ya Ranga
Open
scrub
NEW ALTERNATIVE LINE
MAUNGU STA.
JUNC. OF NDI ALTERNATIVE LINE
Dense bush
Maungu
Waterless except in rains
Open thorn scrub
Waterless
Tsavo R.
Dense thorn
SABAKI STA.
Open scrub
Dense scrub
Medium patches of open country
Dense bush
Jungle
Falls
Dense bush
Open thorn scrub
Waterless
Tsavo R.
Dense thorn
Open grass and scattered trees
Grass
Camp Kenani
Large pool (permanent)
Dense bush
Camp Ngomeni
Scrub
Gap under 3400

e East from Greenwich.

36°

37°

Published by the Royal Geographical Society.


Kikumbulia
Dense scrub
Dense bush
Camp Kenani
Large pool (permanent)
Camp Ngomeni
Gap under 3450
KYULU MOUNTAINS
Reported inhabited by Wakamba
Waterless scrub
TSAVO STA.
TSAVO
R. Tsavo
Rock waterholes
Camp Yamunyani
Medium scrub patches of open country
Medium bush
Dense bush
Waterholes (often dry) Camping ground
R. Mbulini
Open parklike country
Cultivation
Mtiani
NDI
Mbulolo C.
HILLS
Dense aloe thickets
Aloe thickets
VOI STA.
Dense aloe bush
Open thorn scrub; waterless
R. Voi
Track to Taveta in Kilimanjaro
NDARA HILLS
Mbuyuni
Medium bush; waterless
Mzungo ya Ranga
MAUNGU STA.
JUNC. OF MOI ALTERNATIVE LINE
NOI ALTERNATIVE LINE
Maiwa
Mtiani
Maungu
Waterless except in rains
Taru
Desert
Open thorn scrub
Thin low thorn & scrub
Low thorn bush
Waterholes
Buxumma Camp
Patches of euphorbia & aloe
TARU STA.
Taru Hills
Dense thorn bush
Thin bush
Dense scrub
Durumi
R. Mwachi
Mwachi
Mgeno
Mgeno Camp
Mwachi
Mwachi Camp
Mwachi Camp
Mwachi
Mwachi
Mwachi